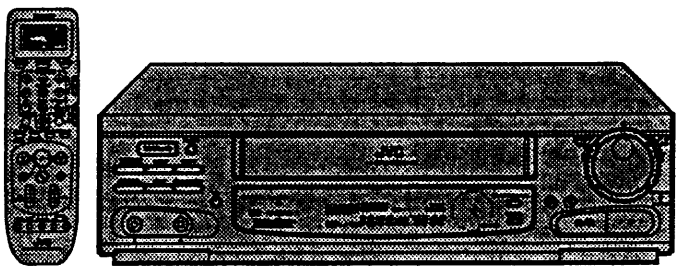
JVC

SERVICE MANUAL

VIDEO CASSETTE RECORDER

HR-J415E/EG



SHOWVIEW

VHS PAL

SPECIFICATIONS

GENERAL

Power requirement		: AC 220 – 240 V~, 50/60 Hz
Power consumption		: 19 W
Temperature		
	Operating	: 5°C to 40°C
	Storage	: –20°C to 60°C
Dimensions (WxHxD)		: 360 x 94 x 348 mm
Weight		: 4.4 kg
Format		: VHS PAL standard
Maximum recording time	(SP)	: 240 min. with E-240 video cassette
	(LP)	: 480 min. with E-240 video cassette

VIDEO/AUDIO

Signal system	: PAL-type colour signal and CCIR monochrome signal, 625 lines/50 fields
Recording system	: Rotary two-head helical scan system with slant double-azimuth combination video heads
Signal-to-noise ratio	: 43 dB (Rohde & Schwarz noise meter)
Horizontal resolution	: 250 lines (260 lines with SQ activated)
Frequency range	: 70 Hz to 10,000 Hz
Input/Output	: 21-pin scart connector x 2
	: RCA connectors (VIDEO IN x 1, AUDIO IN x 1)

TUNER/TIMER

TV channel storage capacity	: 80 positions (+AUX position "AU")
Channel coverage	: VHF 47 – 89/104 – 300/ 302 – 470 MHz
	UHF 470 – 862 MHz
Aerial output	: UHF channel 36 (Adjustable 32 – 40)
Memory backup time	: Approx. 3 min.

ACCESSORIES

Provided accessories	: Aerial cable, Infrared remote control unit, "R6" battery x 2, AC power cord
Optional accessory	: PDC/VPS adapter VU-V115E

Specifications shown are for SP mode unless otherwise specified.
Design and specifications subject to change without notice.

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The following table lists the differing points between Models (HR-J415E and HR-J415EG) in this series.

	HR-J415E	HR-J415EG
VPS	×(OPTION)	○(INCLUDED)

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▒) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.
   Caution for continued protection against fire hazard.
   Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
   5) Barrier

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

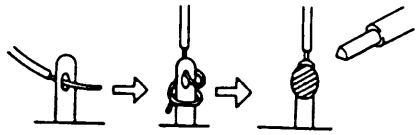


Fig. 1

7. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.

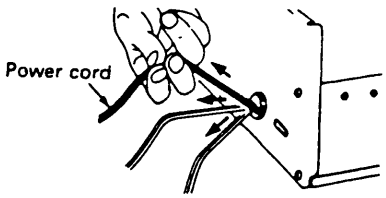


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

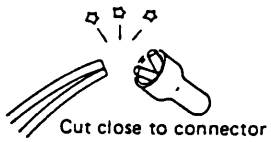


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

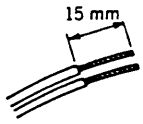


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

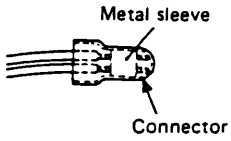


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

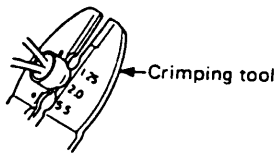


Fig. 6

(5) Check the four points noted in Fig. 7.

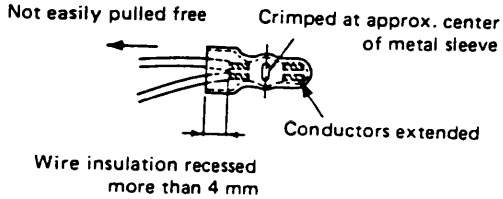

Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

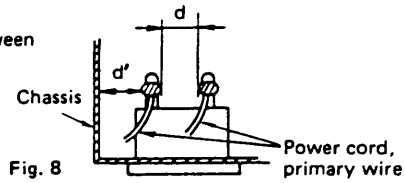


Fig. 8

4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method: (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

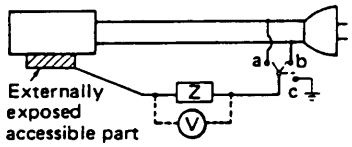


Fig. 9

5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

Measuring Method:

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

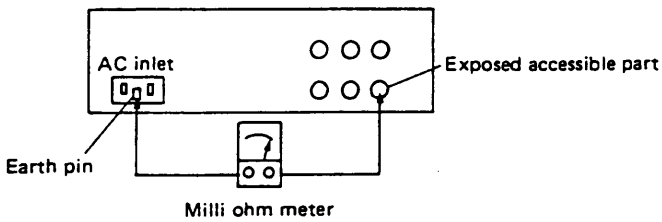


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	Z ≦ 0.1 ohm
Europe & Australia	Z ≦ 0.5 ohm

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	R ≧ 1 MΩ/500 V DC	AC 1 kV 1 minute	d, d' ≧ 3 mm
100 to 240 V			AC 1.5 kV 1 minute	d, d' ≧ 4 mm
110 to 130 V	USA & Canada	–	AC 1 kV 1 minute	d, d' ≧ 3.2 mm
110 to 130 V 200 to 240 V	Europe & Australia	R ≧ 10 MΩ /500 V DC	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	d ≧ 4 mm d' ≧ 8 mm (Power cord) d' ≧ 6 mm (Primary wire)

Table 1 Specifications for each region

AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

INSTRUCTIONS

Safety Precautions

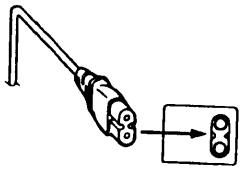
The rating plate and the safety caution are on the rear of the unit.

WARNING: DANGEROUS VOLTAGE INSIDE
WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

The OPERATE button does not completely shut off mains power from the unit, but switches operating current on and off.

This unit is produced to comply with Directives 76/889/EEC, 82/499/EEC, 87/308/EEC and Standard IEC Publ. 65.

CAUTION



- To avoid electric shock or damage to the unit, first firmly insert the small end of the AC power cord into the recorder until it is no longer wobbly, and then plug the larger end of the AC power cord into an AC outlet.
- When you are not using the recorder for a long period of time, it is recommended that you disconnect the power cord from the AC outlet.
- Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial.

WARNING

There are two different types of SECAM colour systems: SECAM-L, used in FRANCE (also called SECAM-West), and SECAM-B, used in Eastern European countries (also called SECAM-East).

1. This recorder can also receive SECAM-B colour television signals for recording and playback.
2. Recordings made of SECAM-B television signals produce monochrome pictures if played back on a video recorder of SECAM-L standard, or do not produce normal colour pictures if played back on a PAL video recorder with SECAM-B system incorporated (even if the TV set is SECAM-compatible).
3. SECAM-L prerecorded cassettes or recordings made with a SECAM-L video recorder produce monochrome pictures when played back with this recorder.
4. This recorder cannot be used for the SECAM-L standard. Use a SECAM-L recorder to record SECAM-L signals.

IMPORTANT:

- It may be unlawful to record or play back copyrighted material without the consent of the copyright owner.
- Please read the "Precautions" section of this instruction manual before installing or operating the recorder.

Video tapes recorded with this video recorder in the LP (Long Play) mode cannot be played back on a single-speed video recorder.

VHS HQ SHOWVIEW

- Only cassettes marked "VHS" can be used with this video recorder.
- HQ VHS is compatible with existing VHS equipment.
- ShowView is a trademark applied for by Gemstar Development Corp. ShowView system is manufactured under licence from Gemstar Development Corporation.
- SQ is a technology owned by NOKIA.

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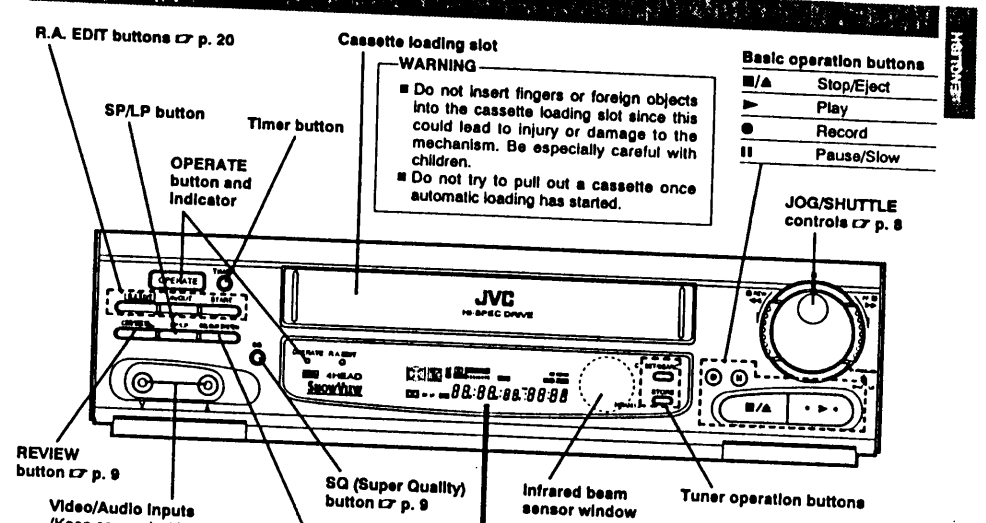
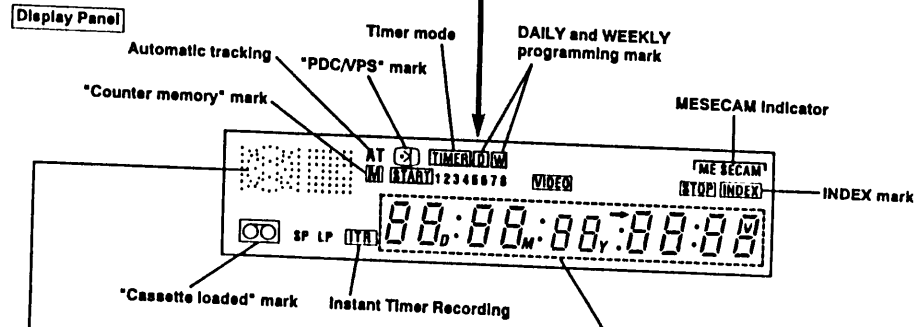
Controls And Indicators

Front Panel


R.A. EDIT buttons ☞ p. 20
Cassette loading slot
WARNING
■ Do not insert fingers or foreign objects into the cassette loading slot since this could lead to injury or damage to the mechanism. Be especially careful with children.
■ Do not try to pull out a cassette once automatic loading has started.
Basic operation buttons
■/▲ Stop/Eject
► Play
● Record
❚❚ Pause/Slow
SP/LP button
Timer button
OPERATE button and indicator
JOG/SHUTTLE controls ☞ p. 8
REVIEW button ☞ p. 9
Video/Audio inputs (Keep covered with the provided cap when not in use.)
SQ (Super Quality) button ☞ p. 9
COLOUR SYSTEM button ☞ p. 11
Infrared beam sensor window
Tuner operation buttons

Display Panel

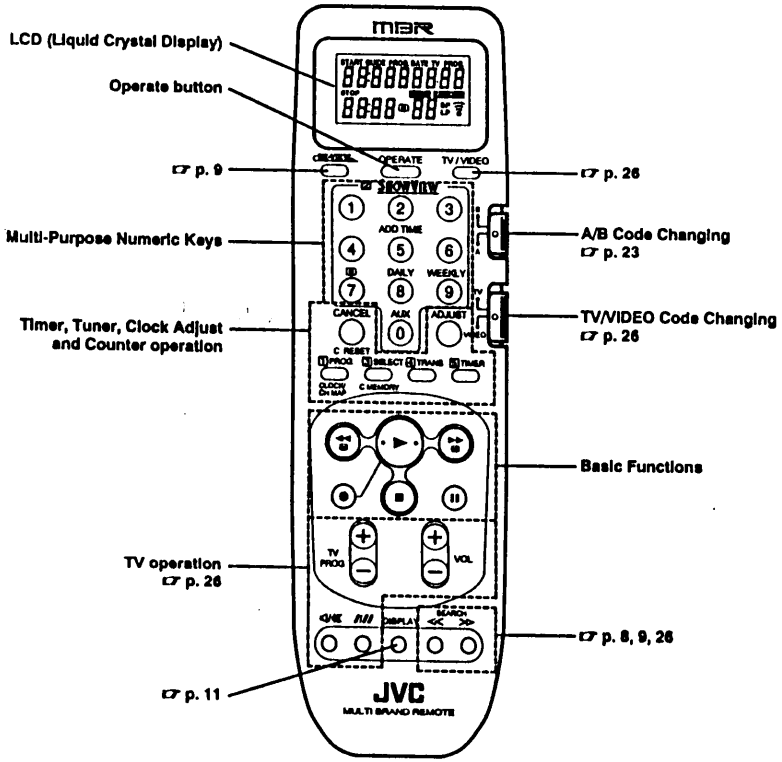


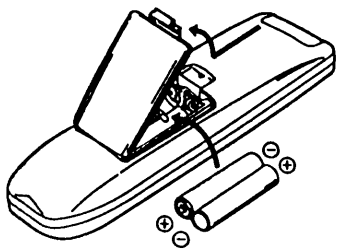
Symbolic mode indicators

PLAY:	▷	REW VARIABLE SHUTTLE SEARCH:	◁ |◁
FF:	▷|	STILL: FORWARD SLOW:	▷ ❚❚
REW:	|◁	RECORD:	○
FF VARIABLE SHUTTLE SEARCH:	▷ |▷	RECORD PAUSE:	○ ❚❚
REVERSE PLAY:	◁		

Controls And Indicators (cont'd)

Wireless Remote Control





Installing Batteries

1. Open the battery compartment cover.
2. Insert 2 "R6"-size batteries (provided) in the correct directions.
3. Replace the cover.

How To Use

The remote control can operate most of your video recorder's functions, as well as basic functions of TV sets of JVC and other brands. ☞ p. 26.

- Point the remote control toward the sensor window.
- The maximum operating distance of the remote control is about 8 m.

Connections

It's essential that your video recorder be properly connected. Follow these steps carefully. THESE STEPS MUST BE COMPLETED BEFORE ANY VIDEO OPERATION CAN BE PERFORMED.

A RECORDER-TO-TV CONNECTION

RF CONNECTION

For TV sets without AV input terminals:

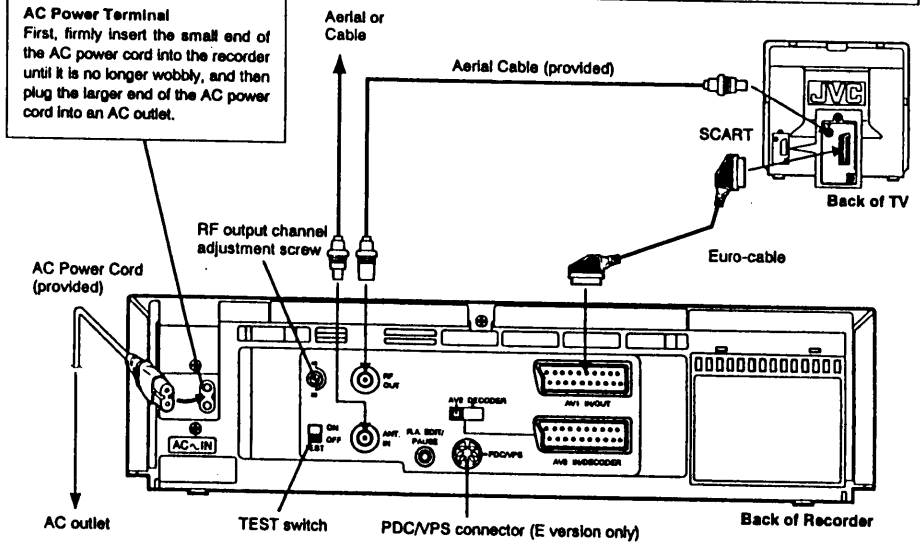
1. Connect the TV aerial cable to the recorder.
2. Connect the recorder to the TV's aerial terminal.

AV CONNECTION

For TV sets with AV input terminals:

1. Connect the aerial, recorder and TV as per "RF CONNECTION".
2. Connect the recorder to the TV's 21-pin SCART connector.

AC Power Terminal
First, firmly insert the small end of the AC power cord into the recorder until it is no longer wobbly, and then plug the larger end of the AC power cord into an AC outlet.

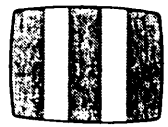


B TUNE THE TV TO YOUR VIDEO RECORDER

The video recorder sends picture and sound signals via the RF connecting cable to your TV on UHF channel 36.

TEST SIGNAL

1. Turn on the recorder.
2. Set the TEST switch to ON.
3. Press TV/VIDEO to engage the VIDEO mode.
4. Set your TV to the video channel. Tune the TV to bring the two vertical white bars on the screen most clearly. (UHF/CH 36)
   - Your TV should be set to the channel designated for use with a video recorder or to a spare channel if there is not a specified video channel on your TV.
5. Reset the TEST switch to OFF.



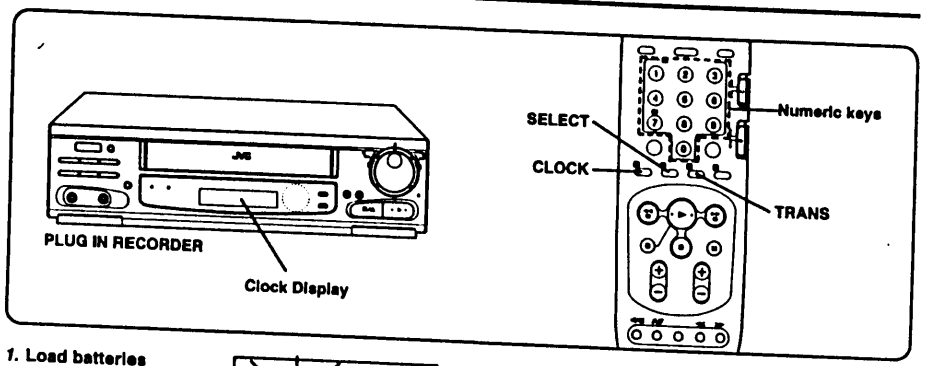
NOTES:

- If CH36 is occupied by a local station, adjust the RF output channel adjustment screw to use another channel between CH32 and CH40 instead.
- If some interference noise is continually seen on the screen, consult your JVC dealer.

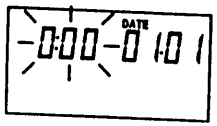
IMPORTANT:

To operate the recorder with your TV using the RF connection, it is always necessary to set your TV's channel to the VIDEO channel. With an AV connection, set the TV to the VIDEO (or AV) mode.

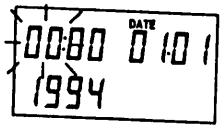
Setting The Clock



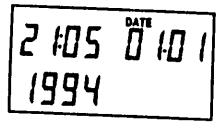
1. **Load batteries** (☞ p. 4).



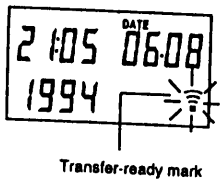
2. **Press CLOCK.**



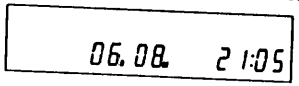
3. **Press the appropriate numeric keys to input the time.**
   - Example: For 21:05, press 2 1 0 5.



4. **Press the appropriate numeric keys to input the day, month and year.**
   - Example: For 6th August, 1994, press 0 6 0 8 1 9 9 4.



5. **Press TRANS with the remote control directed to the recorder's remote sensor window.**
   - The remote control's clock will start. At the same time, the set data will be transferred to the recorder.



TO MAKE CORRECTIONS

Press SELECT button so that the item you want to change blinks. Re-input that item. Continue to step 5.

AFTER A POWER CUT

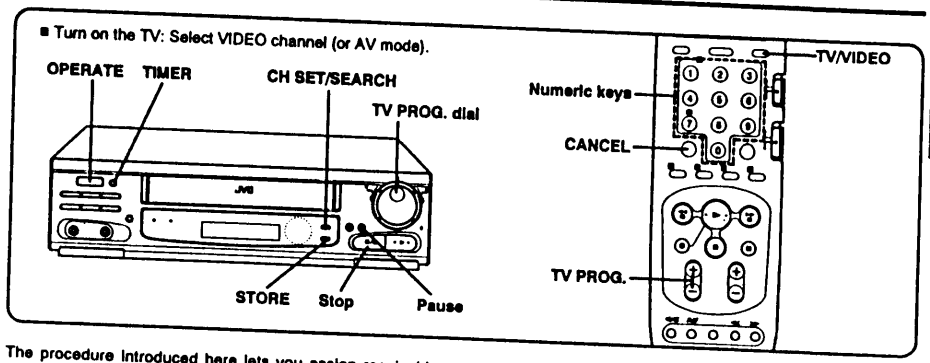
Since your video recorder has a 3-minute backup memory, it will not be affected by short power cuts. If mains power is unavailable for over 3 minutes, however, the recorder's display will reset to 0:00. In such a case, simply transfer the remote control's time to the recorder.

1. Press CLOCK three times.
2. Press TRANS with the remote control directed to the recorder's remote sensor window.

NOTES:

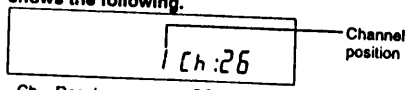
- If the day and month data is invalid (such as 31st April), the month digits are cleared automatically and the day digits will blink. Input again.
- If the year digits are automatically cleared in step 4, it is possible that you have input 29th February for a non-leap year. Input again.
- When the batteries are exhausted, the time display will change to "0:00" and start blinking. Replace all the batteries and set the clock again.

Setting The Tuner



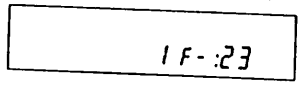
The procedure introduced here lets you assign receivable channels in your area to channel positions on your video recorder's tuner. Once stored, these can be accessed with the TV PROG. buttons.

1. **Press OPERATE to turn on the recorder.**
2. **Press TV/VIDEO to engage the VIDEO mode.**
3. **Press CH SET/SEARCH until the display panel shows the following.**

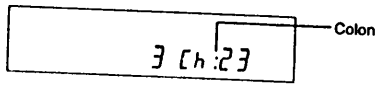


Ch = Regular CC = Cable

4. **Press CH SET/SEARCH again briefly to start automatic scanning for receivable channels.**
   - Automatic scanning stops when a station is detected, and the channel position will blink.
   - Holding down CH SET/SEARCH will start reverse search.
   - If you don't want to store the station detected, simply press CH SET/SEARCH to continue automatic scanning.
5. **Press Pause to fine-tune the channel, if necessary.**
   - When the picture is clear, proceed to step 8.
6. **Turn the TV PROG. dial in either direction so that the picture becomes clear.**



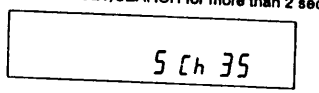
7. **Press Pause.**
8. **Press numeric keys or turn the TV PROG. dial to select the channel position where you wish to store that TV station.**



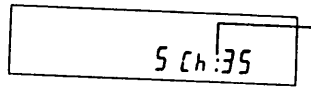
9. **Press STORE to store the station.**
   - The colon will disappear when the station is stored.
10. **Repeat steps 4 through 9 for other receivable channels.**
11. **Press Stop on the recorder to disengage the Channel Set mode.**

TO DELETE STORED CHANNELS

1. Press TV PROG. to select the channel position you want to skip.
2. Press CH SET/SEARCH for more than 2 seconds.



3. Press CANCEL.

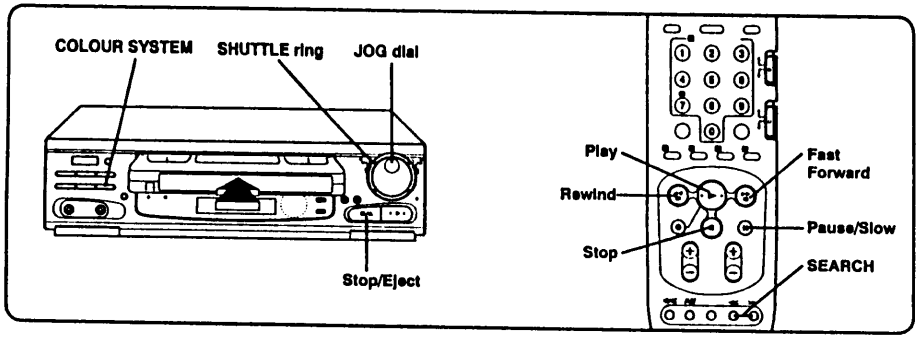


   - The colon will appear when the station is deleted. Channel position 5 can no longer be chosen by TV PROG. buttons.
4. Press Stop on the recorder to disengage the Channel Set mode.

TO STORE NEW CHANNELS

1. Press CH SET/SEARCH for more than 2 seconds.
2. Press TIMER.
   - Real channel starts blinking.
3. Press TIMER to change the band between Ch and CC, if necessary.
4. Press numeric keys to input the number of the real channel you want to store.
5. Press numeric keys to input the number of a vacant channel position.
6. Press STORE to store the channel.
7. Press Stop on the recorder to disengage the Channel Set mode.

Playback



Basic Operations

Preparation

- Turn on the TV.
- Select VIDEO channel (or AV mode).

1. **Load a cassette.**
   - The recorder power will come on automatically.
   - The counter will be reset to "0:00:00" automatically.
   - If the safety tab on the cassette is removed, playback will start automatically.
   - Select the appropriate colour system by pressing the COLOUR SYSTEM button. (☞ p. 11)
2. **Press Play to start playback.**
3. **Press Stop to stop playback.**
   - To rewind the tape, press Rewind or turn the SHUTTLE to the left and release it.
   - To fast-forward the tape, press Fast Forward or turn the SHUTTLE to the right and release it.
   - To stop rewind or fast-forward, press Stop.
4. **Press Stop/Eject on the recorder to eject the tape.**

Variable-Speed/High-Speed Search, Still Playback/Frame Advance/Forward Slow Motion

During Playback or Still:

- Press either SEARCH button for variable-speed search.
- The more times the button is pressed, the faster the playback picture will move.
- To decrease speed, press the button for the opposite direction.

During Playback:

- Press Fast Forward for high-speed forward search, or Rewind for high-speed reverse search.
- For short searches, keep Fast Forward or Rewind pressed for more than 2 seconds. When released, normal playback will continue.
- Press Pause/Slow to view a still picture.
- Press again to advance the picture frame by frame.
- Press Pause/Slow for 2 seconds for slow motion.

Other Functions

JOG/SHUTTLE Control

You can view pictures in slow to fast motion, or frame-by-frame.

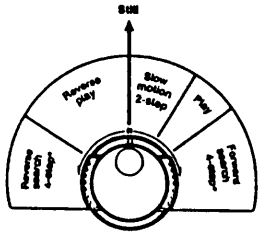
During Playback or Still:

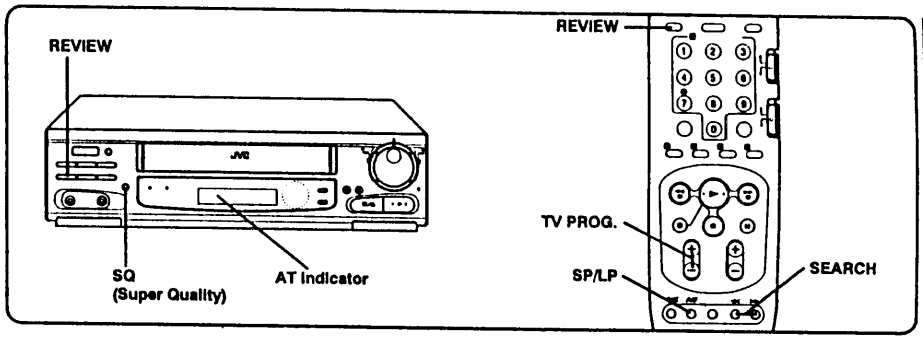
1. Turn the outer ring (SHUTTLE) in either direction. The farther the ring is rotated, the faster the search speed. Releasing the ring stops the picture in the Still mode.
   - For fast-forward with a visible picture, turn the SHUTTLE all the way to the right and release it within 1 second.
   - For rewind with a visible picture, turn the SHUTTLE all the way to the left and release it within 1 second.
   - Slow motion is not possible in the reverse direction.

During Playback or Still:

1. Turn the inner dial (JOG) clockwise for jog control. The tape moves forward frame-by-frame at the speed with which the dial is turned.
   - Frame-by-frame playback is not possible in the reverse direction.
   - By rotating the JOG dial counterclockwise at 2 revolutions per second or faster, reverse play is possible.

To resume normal playback, press Play button.





ENGLISH

S.Q. (Super Quality) Button

Your video recorder is equipped with a special picture circuit that provides a clearer picture with higher-resolution.
Whenever you plug in your recorder and press the OPERATE button, the SQ function turns on also. If you wish to cancel SQ, press SQ so that its light goes off. Pressing SQ turns the function on/off.

NOTES:

- Normally, it is recommended that you keep SQ turned on.
- This button has effect only on playback picture; no effect on recording picture.

Manual Tracking

Your video recorder is equipped with automatic tracking control. If you wish to adjust tracking manually, you can override this function.

During Playback:

1. Press ▮/▮▮ (SP/LP) for manual override.
   - The AT indicator will go out.
2. Press TV PROG. + or – to adjust tracking.
   - Press ▮/▮▮ (SP/LP) to return to automatic tracking.

During Slow:

1. Simply press TV PROG. + or – to adjust tracking.

NOTES:

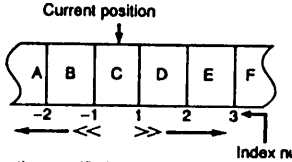
- The recorder automatically stops when still continues for more than 5 minutes.
- If the still picture is unstable, use the TV PROG. buttons to correct the picture.
- During search playback, some noise bars will appear.
- There is no audio during search, slow, still, or frame-by-frame playback.
- When a new tape is inserted, the recorder enters the automatic tracking mode automatically.

Index Search

Your recorder automatically marks index codes at the beginning of each recording. This function gives you quick access to any one of 9 index codes in either direction.

During Stop:

1. Press SEARCH << or >>. "INDEX –1" or "INDEX 1" will be displayed on the display panel and search will begin in the corresponding direction.
2. If you wish to access index codes 2 through 9, press SEARCH repeatedly until the correct index number is displayed.
   Ex.: To locate the beginning of B from the current position, press SEARCH << twice.
   To locate the beginning of D from the current position, press SEARCH >> once.



- When the specified index code is found, playback will start automatically

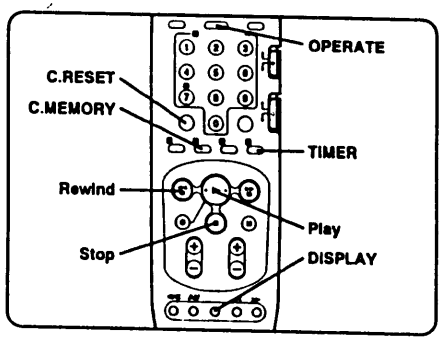
ReView Function

Simply by pressing a single button, the recorder power comes on, rewinds, and begins playback of the last recording. This makes it easier to "review" the programme you have timer-recorded.

When the recorder power is off:
Press REVIEW.

- After the recorder power comes on, the tape will be rewound to the beginning of the last recording (where the index code is placed) and playback will start automatically.
- To play back a recording located 2 index codes away, press REVIEW twice. You can access any one of up to 9 index codes.
- ReView is not possible while the recorder is in the Timer mode.

Playback (cont'd)



Other Functions (cont'd)

Repeat Playback

During Playback:

1. Press Play for more than 5 seconds, and release.
   - The Play indicator (▷) on the display panel will blink slowly.
   - The tape will be played all the way to the end 20 times automatically, and then stop.
2. To stop playback at any time, press Stop.

Counter Memory

During Playback:

1. Press DISPLAY until a counter reading appears on the display panel.
2. Press C.RESET at a point you wish to locate later.
   - The counter will read "0:00:00".
3. Press C.MEMORY.
   - The M indicator will light on the display panel.
4. When you wish to return to that point, press Stop and then Rewind.
   - The tape will rewind and stop at about "0:00:00" automatically.
5. To cancel the Counter Memory mode, press C.MEMORY again.

Next Function Memory

Your recorder can memorise what to do after rewind.

During Stop:

For automatic start of playback after the tape is rewound:

1. Press Rewind.
2. Press Play within 2 seconds.

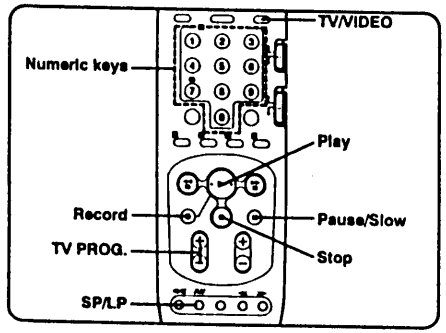
For automatic power off after the tape is rewound:

1. Press Rewind.
2. Press OPERATE within 2 seconds.

For automatic timer standby after the tape is rewound:

1. Press Rewind.
2. Press TIMER within 2 seconds.

Recording



Basic Operations

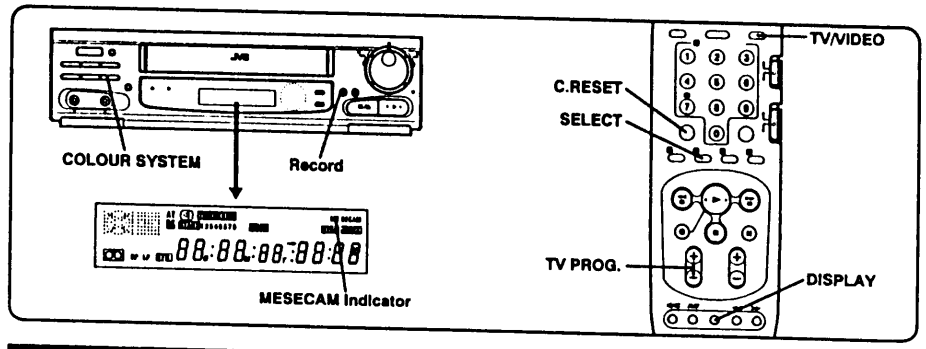
Preparation

- Turn on the TV.
- Select VIDEO channel (or AV mode).

1. **Load a cassette.**
   - The recorder power will come on automatically.
   - Select the appropriate colour system by pressing the COLOUR SYSTEM button.(☞ p. 11)
2. **Press TV/VIDEO to engage the VIDEO mode.**
3. **Press TV PROG. or the numeric keys to select the channel you wish to record.**
   - You can also use the recorder's JOG dial to select the channel.
4. **Press SP/LP to select the tape speed.**
5. **Press Record and Play simultaneously.**
6. **Press Pause/Slow to pause recording.**
7. **Press Play to resume recording.**
8. **Press Stop to stop recording.**

NOTES:

- To start recording with the recorder's Record button, press it once on its own.
- After pause, when recording is resumed, a few frames recorded before the pause may be overlapped by the new recording. This is meant to reduce picture distortion and is not a malfunction.
- The recorder automatically stops when record-pause continues for more than 5 minutes.
- If the Record button does not work, check to see if the cassette's safety tab has been removed.
- The channel cannot be changed while recording is in progress. To change the channel, engage the record-pause mode, then change the channel.
- The recorder automatically rewinds when the end of the tape is reached during recording.
- When a PDC/VPS programme is being broadcast on the selected channel, " " mark appears on the display panel. ☞ p. 17 for information on PDC/VPS.



Other Functions

Setting of Colour System button

You can also record SECAM signals, or play back a MESECAM tape on this recorder.

- Press COLOUR SYSTEM so that the MESECAM indicator appears on the display panel.
- When recording PAL signals or playing back a PAL tape, press COLOUR SYSTEM again until the MESECAM indicator disappear.

To Watch Another Programme While Recording

During Record:

1. If your recorder is connected to the TV via AV connection, press TV/VIDEO.
   - The recorder's VIDEO indicator and the TV broadcast being recorded will disappear.
2. Use the channel controls on the TV to select the other channel you wish to view.
   - The programme selected with the TV channel controls will appear on the TV screen while the one selected with the video recorder's channel controls will be recorded on the tape.
   - If a decoder is connected to the recorder (☞ p. 24), you can select a scrambled channel as well with the TV channel controls.

Instant Timer Recording (Off Timer)

You can start a recording and then set the recorder to shut off automatically after a set duration.

During Record:

1. Press recorder's Record. "ITR" and "0:30" indications appear, advising that power will switch off after 30 minutes.
2. Press Record again to delay the off-time by 30-minute increments (up to 4 hours).
   - For more precise setting, use the remote control's SELECT and TV PROG. buttons to set the exact time required (possible up to 8 hours and 59 minutes).

Elapsed Recording Time Indication

When you need to know the exact time of a recording.

1. Press DISPLAY until a counter reading appears on the display panel.
2. Press C.RESET before starting recording or playback.
   - The counter will be reset to "0:00:00" and show the exact elapsed time as the tape runs.

Display Button

When you wish to check the time, date, or counter reading

1. Press DISPLAY to display the current clock time.
2. Press DISPLAY again to display the current date.
3. Press DISPLAY again to display the counter reading.

Preparation for ShowView Timer Programming

What is ShowView?

For timer-recording to take place, information such as the channel, date, start time and stop time of the programme you wish to record, must be programmed into the recorder's timer memory. The ShowView system condenses all this information into a simple ShowView code number 4 to 9 digits long.

Since the ShowView number contains information on the channel number, if you live in an area that uses channel numbers that are different from those listed in your TV directory, these "differences" must be input into the remote control. This process is called "Channel Mapping" (CH MAP).

CHECK THE GUIDE PROG. NUMBERS

Preparation

- Make sure you have set the clock. (☞ p. 6)
- Make sure you have set the tuner. (☞ p. 7)
- Get a TV schedule listing (magazine, newspaper, etc.) which carries ShowView code numbers.

Ⓐ Find out the channel position numbers your recorder tunes to when you use the TV PROG. –/+ buttons (the positions you stored on page 7) and write them into the list.

Example: 1, 2, 3, 4, 6, 8, 10, 12

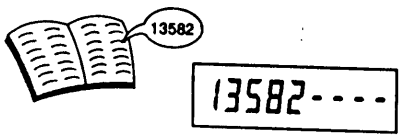
Ⓑ Look through the TV listing and find out the broadcast station name of each of the channels.

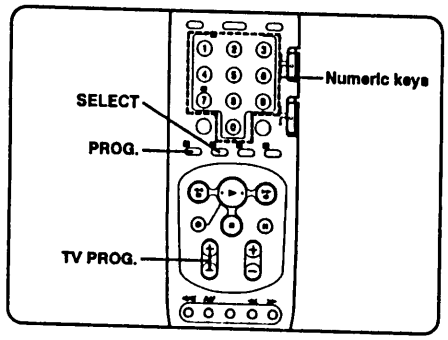
Ⓒ Use the ShowView numbers to find out the GUIDE PROG. numbers for each of the stations.

How to check:

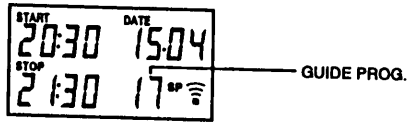
1. **Press PROG.**

2. **Press the appropriate numeric keys to enter the ShowView number for a programme as it appears in your TV listing.**
   - Make sure the ShowView number is for a programme which has not been broadcast yet.





3. **Press SELECT.**



- The number that appears as the channel number is the GUIDE PROG. number for that station. Write it into the list.

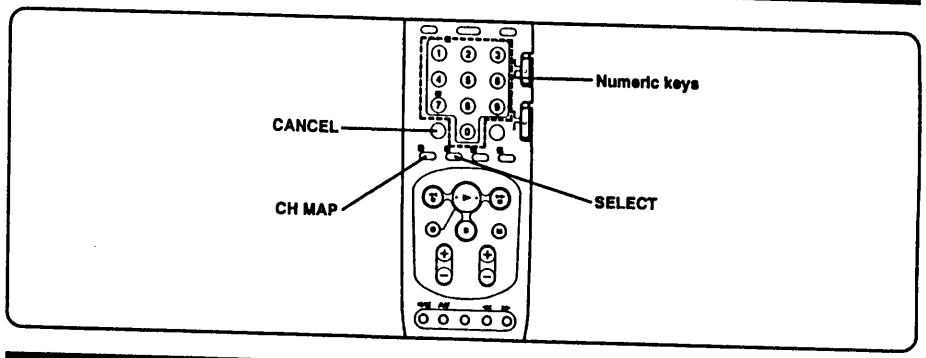
ATTENTION

- When you press the SELECT button in step 3, "Err(or)" may appear on the LCD. This may mean that...
  - you entered a ShowView number for a programme which has already passed.
  - the GUIDE PROG. number for that station is a 3-digit number.
- For 3-digit GUIDE PROG. numbers, refer to your TV listing or consult your JVC dealer.

4. **Press PROG. and display the clock time.**
   - **Repeat steps 1– 4 and check the GUIDE PROG. number for each of the channels your recorder receives.**

Ⓐ Channel on your recorder (TV PROG. number)	Ⓑ Station name	Ⓒ GUIDE PROG. number
(ex.) 1	ARD	1
2	ZDF	2
3	WDR	17

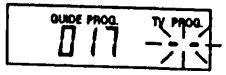
In cases where the channel number your recorder receives and the GUIDE PROG. number for that station do not match, it is necessary to make changes in the remote control's Channel Map. (continued on next page)



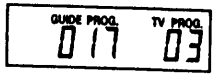
INPUT GUIDE PROG. NUMBERS INTO REMOTE

1. **Press CH MAP until the Channel Map display (below) appears in the remote control's LCD.**

2. **Press the appropriate numeric keys to enter the GUIDE PROG. number (Ⓒ column in your list).**
   Ex.: For "1", press
   0, 0, 1.
   For "10", press
   0, 1, 0.

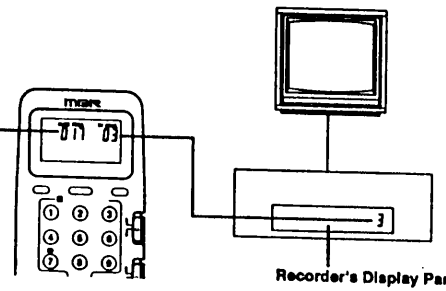


3. **Press the appropriate numeric keys to enter the channel number your recorder receives that station on. (TV PROG. number, Ⓐ column in your list.)**
   Ex.: For "3", press
   0, 3.



4. **Press SELECT.**
   - To input other channels into the Channel Map, repeat steps 2 – 4 above.
5. **Press CH MAP and display the clock time.**

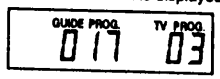
Ex.: From column Ⓐ in the list: The GUIDE PROG. number for WDR is "17".
From column Ⓐ in the list: The TV PROG. number for WDR is "3".



TO CHECK/CANCEL GUIDE PROG. NUMBERS IN THE REMOTE

1. Press CH MAP until the Channel Map display (below) appears in the remote control's LCD.

2. Press SELECT until the GUIDE PROG. number you wish to check or cancel is displayed.



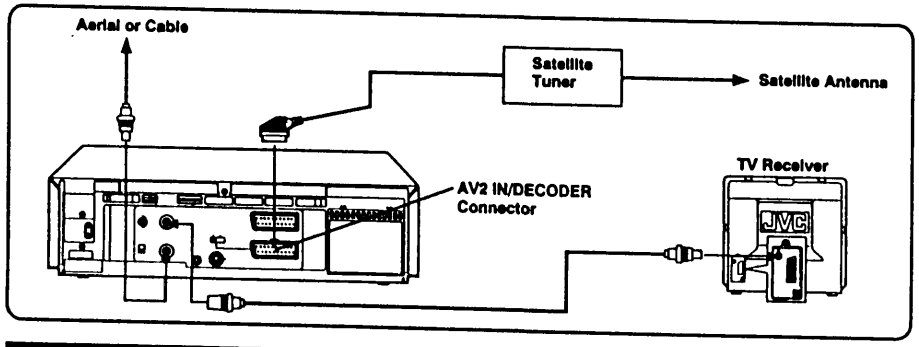
To Cancel:

3. Press CANCEL.
4. Press CH MAP and display the clock time.

NOTES:

- When you move to another area, be sure to make changes in the Channel Map as necessary.
- When the remote control's batteries are replaced, the time or Guide Channel numbers you have set may be erased. If this happens, reset them again.

Preparation for ShowView Timer Programming (cont'd)

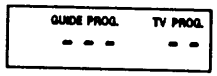


TO RECORD SATELLITE PROGRAMMES

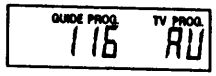
Timer programming is also possible for programmes received via satellite tuner.

Preparation

1. **Connect the satellite tuner as illustrated to the AV2 IN/DECODER connector.**
   - Make sure the AV2/DECODER switch is set to "AV2".
2. **Press CH MAP until the Channel Map display (below) appears in the remote control's LCD.**



3. **Press the appropriate numeric keys to enter the GUIDE PROG. and TV PROG. numbers as follows:**
   - For GUIDE PROG., enter the GUIDE PROG. numbers of the satellite stations that are receivable through your satellite tuner.
   - For TV PROG., always enter "00". When "00" is entered, "AU" will appear in the LCD.



4. **Press SELECT.**
   - To input other satellite stations into the Channel Map, repeat steps 3 – 4 above.
5. **Press CH MAP and display the clock time.**

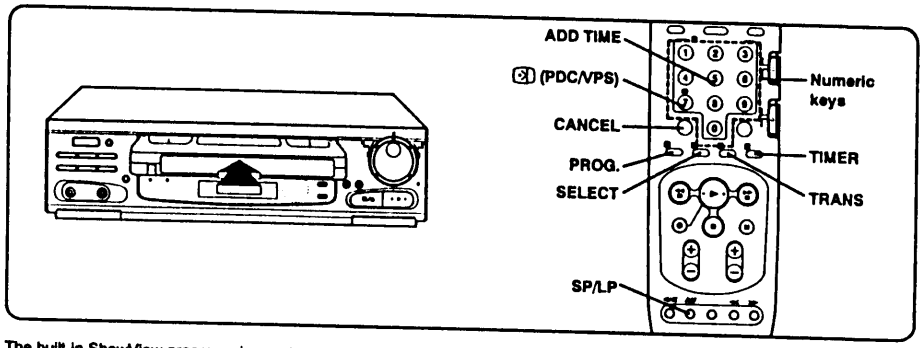
Operation

1. Turn on the satellite tuner and select the channel you wish to record.
2. Enter the ShowView number in the same way as shown in steps 1 – 7 of ShowView Timer Programming on p. 15.

NOTE:

- After selecting the programme you wish to record from your satellite tuner, set the system's timer. If your satellite tuner does not have a timer, leave it switched on.

Timer-Recording — ShowView Timer Programming —



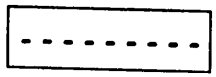
The built-in ShowView programming system greatly simplifies timer programming because you won't have to enter all the data that is usually necessary (such as date, start and stop time, and channel).

TIMER PROGRAMMING IS NOT POSSIBLE UNLESS THE CLOCK HAS BEEN SET.

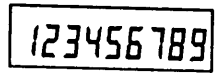
Preparation

- Make sure you have set the GUIDE PROG. numbers (☞ p. 12 – 14).
- Insert a cassette with the safety tab in place. The recorder power will come on automatically.
- Select the appropriate colour system by pressing the COLOUR SYSTEM button. (☞ p. 11)

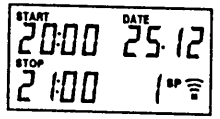
1. **Press PROG.**



2. **Press the appropriate numeric keys to enter the ShowView number for the TV programme you wish to record.**
   - For ShowView numbers, refer to your newspaper or TV directory.



3. **Press SELECT.**
   - The LCD will show the data for the ShowView number you just entered.
   - If the entered ShowView number is not proper, "Err" appears on the LCD. Check the ShowView number again and re-enter it.
   - If you wish to take advantage of PDC/VPS* recording (☞ p. 17), " " should be displayed on the LCD; if not, press (the numeric key "7") to make it appear.



WEEKLY program: After step 3, press numeric key "9".
DAILY (Mon. – Fri.) program: After step 3, press numeric key "8".

4. **Press SP/LP to select the tape speed.**
5. **Press TRANS with the remote control directed toward the recorder's Remote Sensor window.**
6. **Press PROG.**
   - The LCD returns to the clock display and the entered data will be automatically cleared.
   - If you need to set another program, repeat steps 1 – 6.
7. **Press TIMER.**
   - The recorder will enter the Timer mode and power will go off.

TO DELAY THE STOP TIME

After you press SELECT in step 3, press the ADD TIME button. Each time the ADD TIME button is pressed, the Stop time is delayed by 5 minutes (5 minutes of recording time is added). You can easily compensate for anticipated programme schedule delays this way.

TO MAKE CORRECTIONS

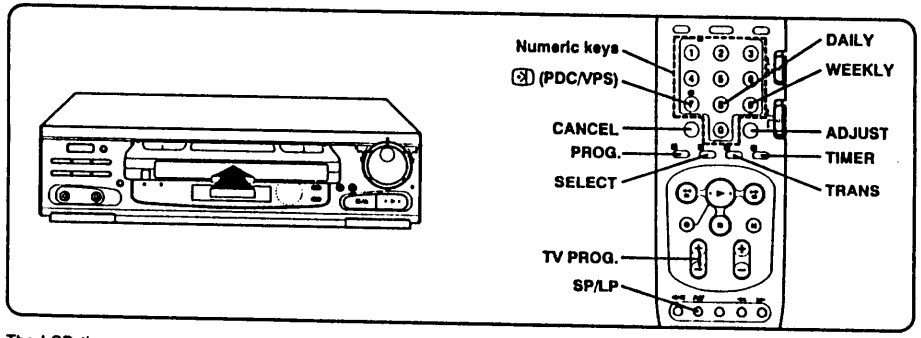
- In step 2, press CANCEL to backspace and re-enter the correct ShowView number.
- After checking the data in step 3, press PROG. twice and re-enter the correct ShowView number.
- After checking the data in step 3, if you want to delay the stop time, etc. press SELECT to make the item you want to change blink, and input new data.
- Pressing PROG. clears the programmed data.

To check, cancel and replace programs, ☞ p. 16.

To use the recorder after setting to the Timer mode, ☞ p. 16.

** PDC/VPS adapter is required with "E" models. PDC recording is not possible with "EG" models.*

Timer-Recording (cont'd) — LCD Timer Programming —

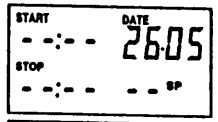


The LCD timer programming lets you input all necessary settings manually. It's helpful if the ShowView number for the TV programme you want isn't readily available.

Preparation

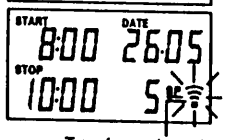
- Insert a cassette with the safety tab in place. The recorder power will come on automatically.
- Select the appropriate colour system by pressing the COLOUR SYSTEM button.(☞ p. 11)

1. **Press PROG. twice.**
2. **Press numeric keys to input the date.**



Ex.: For 26th May, press 2 6 0 5.

3. **Press numeric keys to input the start time, stop time and channel.**



Ex.: For 8:00, press 0 8 0 0.

Transfer-ready mark

WEEKLY program: After you input the channel and the transfer-ready mark appears on the LCD, press numeric key "0".

DAILY (Mon. – Fri.) program: After you input the channel and the transfer-ready mark appears on the LCD, press numeric key "8".

- If you wish to take advantage of PDC/VPS* recording (☞ p. 17), "⊡" should be displayed on the LCD; if not, press (the numeric key "7") to make it appear.

4. **Press SP/LP to select the tape speed.**
5. **Press TRANS with the remote control directed to the recorder's Remote Sensor window.**
6. **Press PROG.**
   - The LCD returns to the clock display and the entered data will be automatically cleared.
7. **Press TIMER.**
   - The recorder will enter the Timer mode and power will go off.

PDC/VPS adapter is required with "E" models. PDC recording is not possible with "EG" models.

TO MAKE CORRECTIONS

- During steps 2 and 3, press CANCEL to backspace and input new data.
- After setting the channel in step 3, press SELECT to make the item you want to change blink, and input new data.
- Pressing PROG. clears the programmed data.

TO CHECK, CANCEL AND REPLACE PROGRAMS

To check preset programs:

1. Press ADJUST until the program settings are displayed on the display panel.
   - Program 1 is displayed with the number blinking.
2. Press SELECT to review the program contents in succession.
3. To check another program, press ADJUST again.

To cancel the program:

4. Press CANCEL.
   - You can press CANCEL at any stage while the program is open.

To replace a program:

5. Use the SELECT and TV PROG. buttons to input new data.

TO USE THE RECORDER AFTER SETTING TO THE TIMER MODE

For safety, your recorder disables all other functions while in the Timer mode.

- Press TIMER to disengage the Timer mode.
- To re-engage the Timer mode, press TIMER.

NOTE:

- If you have a satellite tuner connected to the recorder's AV2 IN/DECODER socket and wish to timer-record satellite programmes, make sure to input "0" for the channel number in step 3 to make "AU" appear on the LCD. After you transfer the data to the recorder, "AU 2" will be displayed instead of a channel number on the recorder's display panel.

Error Indications

The following error indications may appear on the recorder when you press the TIMER button to engage the Timer Standby mode. Here's why, and what you should do.

- "TIMER" and "⊡" on the display panel continue blinking.
  WHY: There is no cassette in the recorder.
  WHAT TO DO: Insert a cassette.

- The cassette is automatically ejected. "TIMER" and "⊡" continue blinking.
  WHY: The inserted cassette has its safety tab removed.
  WHAT TO DO: Insert a cassette with its safety tab intact. Or cover the safety tab hole of the cassette with adhesive tape and re-insert it. ☞ p. 27.

- "TIMER" blinks for 10 seconds and the Timer Standby mode is cancelled.
  WHY: There are no preset programs in memory, or they have all been incorrectly preset.
  WHAT TO DO: Check the programmed data and re-program it as necessary. Press TIMER again.

Other Indications

- "TIMER" steady lit (with clock display).
  WHY: The recorder is in the Timer Standby mode. This is the normal display you should see when you press the TIMER button.

- "○" and "TIMER" steady lit.
  WHY: Normal display while timer-recording is in progress.

- The cassette was ejected, with power off and "TIMER" and "⊡" are blinking.
  WHY: This means that the end of the tape was reached while timer-recording was in progress. Therefore, the preset program may not be recorded in its entirety.

- "0:00" blinking.
  WHY: This means the clock must be set. It's displayed when time-keeping is terminated due to a power failure or because the recorder's power plug was pulled from the AC outlet.
  WHAT TO DO: Set the clock. ☞ p. 6.
- If power was interrupted, it's also likely that all preset timer programming data has been erased. Please check and re-program as necessary.

- "-- -- -- -- --" is displayed for about 5 seconds when the TRANS button is pressed.
  WHY: Data was not successfully transferred. The program may have been incorrectly preset, or the recorder's clock has not been set, or all the recorder's timer programs (1 – 8) are preset.
  WHAT TO DO: Check the LCD program, and re-program as necessary. Transfer the correct data. Or cancel unnecessary programs, and transfer again.

PDC/VPS Recording

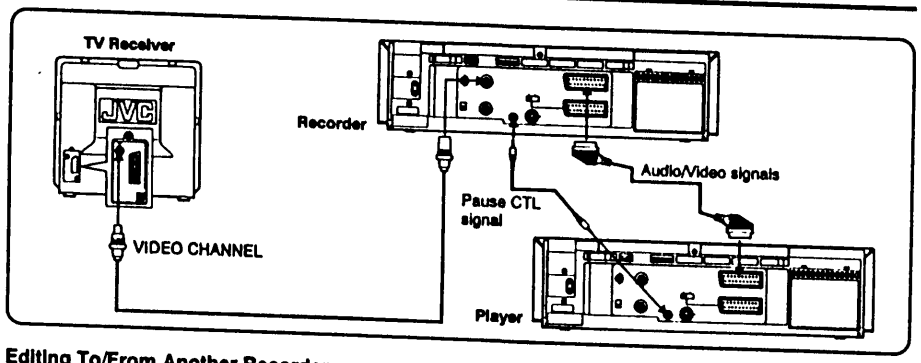
Now available from some TV stations, PDC (Program Delivery Control) or VPS (Video Program System) is a service designed to assure safe, accurate timer-recording. With this system, special code signals are transmitted together with the audio/video signals. These code signals control your video recorder and have precedence over advertised times you preset in the timer. This means that your recorder will start and stop recording when the preset TV programmes actually start and end — even if the broadcast time of a preset TV programme is changed.
If your video recorder is an "EG" model, it already incorporates a built-in VPS decoder. If your recorder is an "E" model and you want to take advantage of this service (if available), you must connect an optional PDC/VPS adapter VU-V115E to the PDC/VPS connector on the rear panel of your recorder.

TO USE PDC/VPS SERVICE

- During ShowView or LCD timer programming, make sure that "⊡" is displayed on the LCD before transferring the programme data to the recorder.
- If "⊡" is not displayed on the LCD, press the ⊡ button (the numeric key "7") to make it appear. Pressing the ⊡ button alternates the setting.

NOTES:

- When you enter programmes, set the start time (PDC or VPS time) exactly as advertised in the TV listing. A different time than advertised will result in no recording.
- PDC recording is not possible with an "EG" model.



Editing To/From Another Recorder

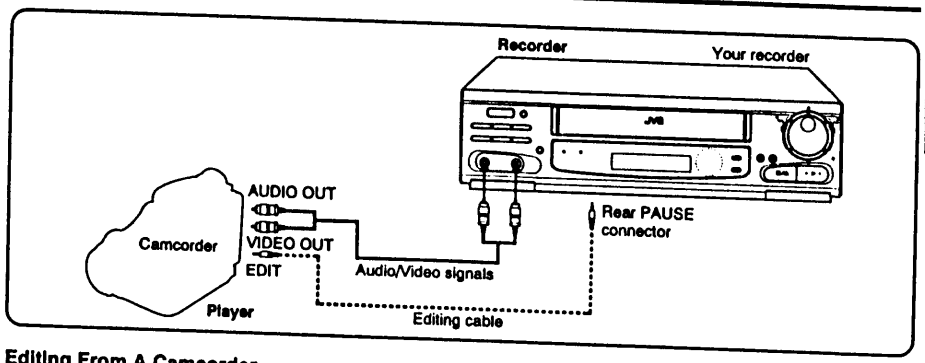
Preparation

- Connect the player's AV1 IN/OUT connector to the recorder's AV1 IN/OUT or AV2 IN/DECODER connector.
- Press your recorder's COLOUR SYSTEM button to select the appropriate colour system. (☞ p. 11)

	Player	Recorder
1	Load the source tape.	Load the recording tape.
2		Select the external input mode. **With this video recorder,** ■ If connected to the AV1 IN/OUT connector, press TV PROG. until "AU 1" appears on the display panel. ■ If connected to the AV2 IN/DECODER connector, make sure the AV2/DECODER switch is set to "AV2", and press TV PROG. until "AU 2" appears.
3		Press and hold down the Pause button while you press the Record button to enter the Record-Pause mode.
4	Play back the source tape to search for a scene to be edited.	
5		Start recording where you want to start editing, with this recorder, by pressing the Play button.
6		To stop editing temporarily, press the Pause button.
	Repeat steps 4 through 6 to continue editing.	
7	To stop editing, press the Stop button.	

NOTES:

- Your video recorder can be used as either the recording deck or the source player when editing tapes. When used as the source player in combination with another video deck which is preroll-capable and equipped with a Pause Control Output terminal, your recorder's PAUSE terminal can accept preroll commands for synchronized preroll editing.
- While editing, it is recommended that you turn off SQ.(☞ p. 9)



Editing From A Camcorder

Preparation

- Connect the camcorder's A/V output connectors to the recorder's front panel V (Video) and A (Audio) connectors.
- Press your recorder's COLOUR SYSTEM button to select the appropriate colour system (☞ p. 11).

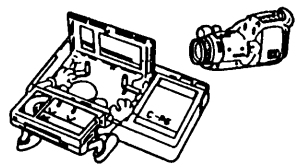
	Camcorder	Recorder
1	Load the source tape.	Load the recording tape.
2		Select the external input mode: ■ Press the numeric key "0". "F-AU" will appear instead of a channel number.
3		Press and hold down the Pause button while you press the Record button to enter the Record-Pause mode.
4	Play back the source tape to search for a scene to be edited.	
5		Press the Play button where you want to start editing.
6		To stop editing temporarily, press the Pause button.
	Repeat steps 4 through 6 to continue editing.	
7	To stop editing, press the Stop button.	

NOTES:

- If the camcorder is equipped with the Master Edit Control system, you can control the recorder using the camcorder's controls. See the camcorder's instruction manual for operating procedures.
- Connections made to the front panel Video and Audio input automatically override the rear panel AUDIO/VIDEO input connection.

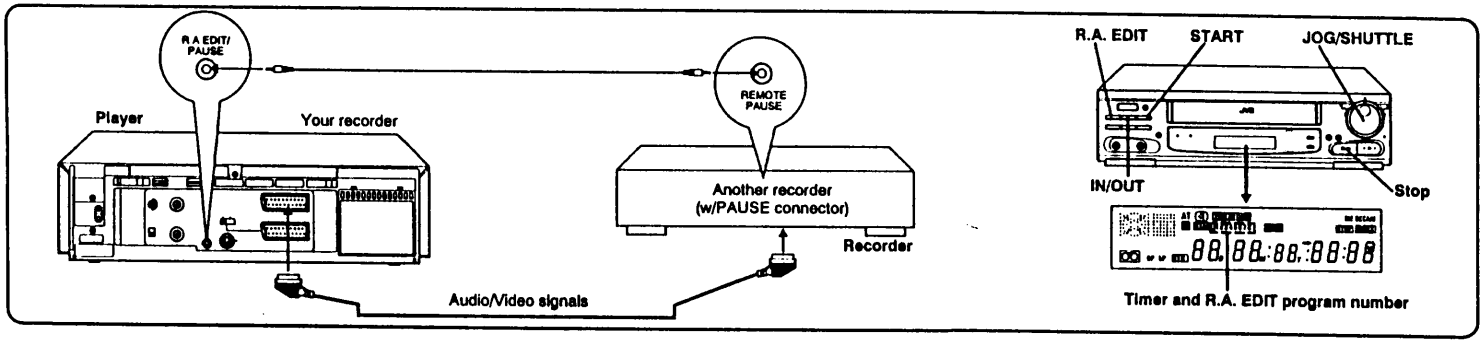
To Watch A Compact VHS Tape

Compact VHS camcorder recordings (PAL) can be played on your video recorder. Place the recorded cassette into a C-P8 Cassette Adapter and it can be used like any full-sized VHS cassette.



Editing (cont'd)

— Random Assemble Editing —



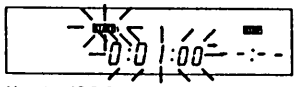
PREPARATION

This function makes it easier to create edited videos when your recorder is used as the source player in combination with another video deck which is equipped with a PAUSE (i.e. REMOTE PAUSE) terminal. You can pre-program up to 8 scenes or "cuts" for automatic editing in the sequence you have specified.

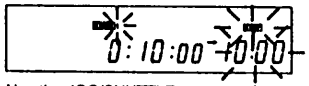
1. Connect your recorder's AV1 IN/OUT connector to the recording deck's AUDIO/VIDEO IN connectors.
2. Connect your recorder's R.A.EDIT connector to the recording deck's PAUSE connector.
   - If the recording deck does not have a PAUSE connector, connect to the R.A.EDIT connector.
3. Turn both units on.
4. Engage the recorder's AUX (Iliary) mode.

OPERATION

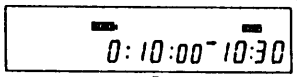
1. Insert a recorded cassette into your recorder, and insert a cassette (with safety tab intact) into the recording deck.
2. Play back the tape in your recorder.
3. Press the R.A.EDIT button.
   - The display panel will change to the R.A.EDIT mode.

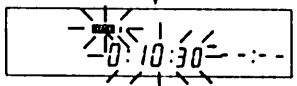


4. Use the JOG/SHUTTLE to search for the point where you want an edited scene to start, and press IN/OUT.
   - The cut-in point is registered in memory.



5. Use the JOG/SHUTTLE to search for the point where you want the scene to end, and press IN/OUT.
   - The cut-out point is registered in memory.





6. Specify additional scenes by repeating steps 4 – 5.
7. Put the recording deck in the Record-Pause mode.
8. Press START.
   - The function begins automatic editing; all the specified scenes are copied to the recording deck in sequential order.

   - While a scene is being searched, the recording deck automatically enters the Record-Pause mode.
   - When Random Assemble Editing is finished, your recorder enters the Still mode, the recording deck enters the Record-Pause mode, and the cursor blinks at the next available scene number.
9. Press R.A.EDIT again.
10. Press Stop on both decks to end Random Assemble Editing.

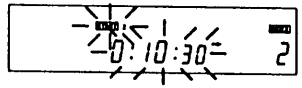
To check, cancel and replace programs, ☞ p. 22.

Sound Shuttle

You can also monitor the sound when searching for scenes you want to edit in steps 4 – 5.
Since you can hear the soundtrack during selection, you can avoid abrupt or unnatural sounding scene-to-scene connections.

Using Index Search With Random Assemble Editing

In step 4, Index Search can also be used to locate your edit points. When used, "INDEX" and the index number will appear on the display panel. For Index Search ☞ p. 9.



- Using Index Search during R.A.Edit will result in a reduction in accuracy.

Memory Capacity

Random Assemble Editing utilizes the same memory space as the recorder's timer; so the number of sequences available to this function may not be 8, depending on how many programs are already stored in memory.
Example: When three programs are stored in memory (timer program number 1, 3 and 4).

	Program number on display panel							
Timer program	1		3	4				
R.A.EDIT program		2			5	6	7	8

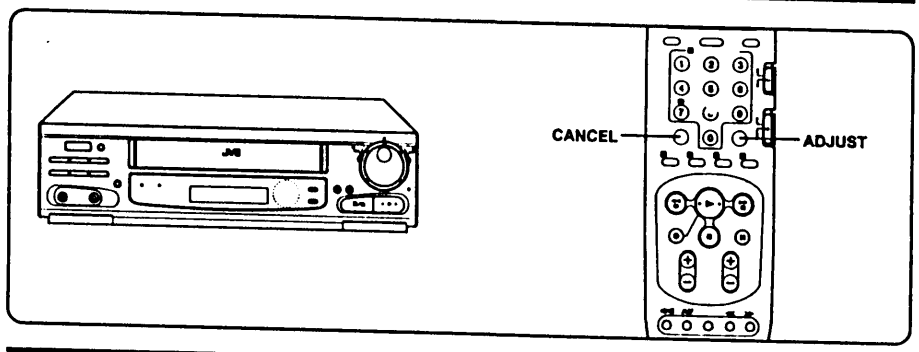
Only 5 programs can be programmed for R.A.EDIT. The program numbers 2, 5, 6, 7, 8 are available and R.A.EDIT will be performed in this order.

- If the display panel shows "-- -- -- -- --" when you press R.A.EDIT, the memory is already full of timer programs. If this happens, cancel some of the timer programs. (☞ p.16.)

NOTES:

- When editing, there may be a discrepancy of about 2 seconds on the playback tape between the locations you chose as cut-in/out points and the locations the recorder recognizes as those points.
- For any scene, the cut-out point must have a counter reading that is at least 1 second after the cut-in point. A cut-out point with a counter reading less than or the same as the cut-in point will not be registered.
- Since the playback deck prerolls during Random Assemble Editing, there must be at least 15 seconds worth of recorded material prior to any cut-in point on the playback tape.
- If the search time for a cut-in point exceeds 5 minutes, the recording deck's Record-Pause mode will be cancelled and editing will not take place.

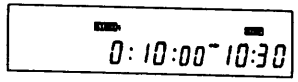
Editing (cont'd) — Random Assemble Editing —



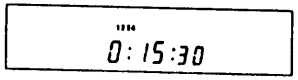
TO CHECK PROGRAMS

While in the R.A.EDIT mode:

1. Press ADJUST.
   - The display panel shows the program number and contents in chronological order as the button is pressed.



- If you press ADJUST again after the last program is displayed, the total running time of the edited program will appear.



- You can also check the current total running time during programming.

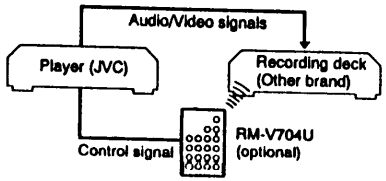
TO CANCEL AND REPLACE PROGRAMS

During steps 4 and 5 (☞ p. 20) or when checking programs:

1. Press CANCEL.
   - The displayed program will be cleared.
   - To cancel another program, press ADJUST until the program you want to cancel appears on the display panel, and then press CANCEL.
   - To replace a program, perform steps 4 and 5.

Optional RM-V704U Multi-Brand R.A.Edit Remote Control

By connecting this remote control to your recorder's R.A.EDIT Connector, Random Assemble Editing will become possible in conjunction with a second non-JVC deck. The RM-V704U is compatible with various European VCR brands — convenient especially if you already own a recorder other than JVC. For compatible systems and availability, please consult your JVC dealer.



NOTE:

- Although the RM-V704U is designed to operate the recording deck, it may not work with some VCRs, or may have limited function capability.

Other Functions

Remote A/B Code Switching

The remote control is capable of controlling two JVC video recorders independently; one set to respond to your remote control's A code control signals and another set to respond to B code control signals. The remote control is preset to send A code signals because your video recorder is initially set to respond to A code signals. You can easily modify your video recorder to respond to B code signals.

1. Unplug the recorder's power cord from the AC outlet.
2. Set the A/B code switch to B.
3. Plug the power cord back into the AC outlet. Do not use other remote controls at this stage.
4. Turn the recorder power on using the remote control's OPERATE button. The recorder will now only respond to B code signals.

NOTE:

Some TV sets may malfunction in response to the B mode. If this happens switch back to the A mode.

Locking The Recorder's Controls

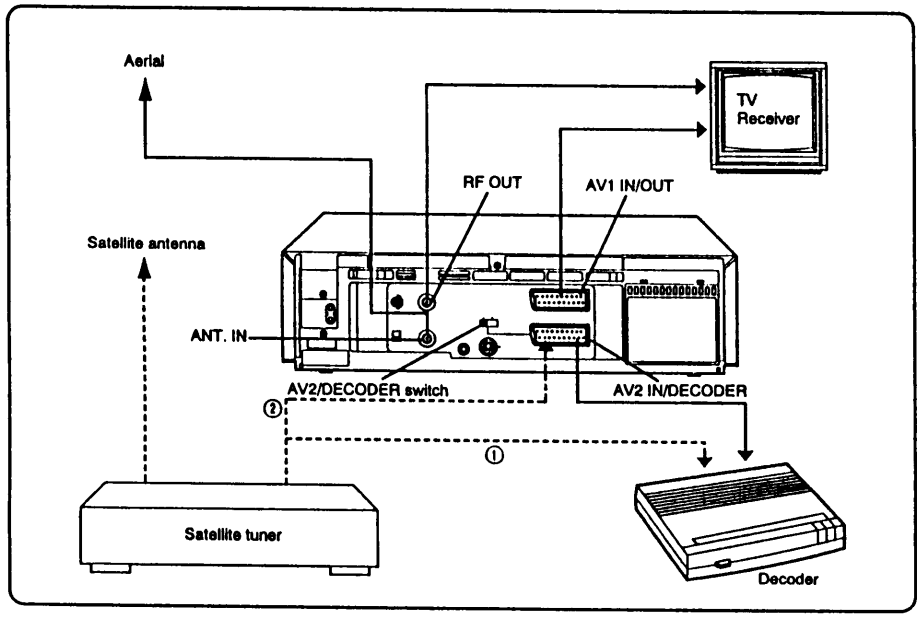
To avoid unwanted operation and prevent accidental recording...

1. Press the remote control's OPERATE button to turn the recorder's power off. Keep this button pressed for about 2 more seconds after the power LED indicator has gone off.
   - The Child Lock indicator (–) will appear on the display panel.
2. Child Lock is cancelled when you switch the recorder's power on with the remote's OPERATE button.
   - Pressing the TIMER button during timer-recording also cancels the Child Lock mode.

NOTES:

- While Child Lock is engaged, make sure you keep your remote control in a safe place inaccessible to children.
- Timer-recording is possible in the Child Lock mode. After timer-recording is done, Child Lock remains in effect.

Information On Scrambled Broadcasts



CONNECTIONS

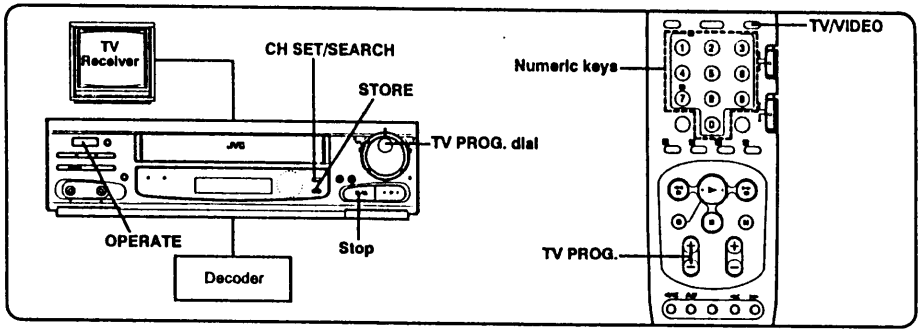
The AV2 IN/DECODER connector can be used as an input terminal for an external decoder (descrambler). Simply connect a decoder and you can enjoy the variety of programming that is available through scrambled channels.

1. Connect your recorder and TV via their AV connectors (☞ p. 5, AV CONNECTION).
2. Set the AV2/DECODER switch on the recorder's rear panel to "DECODER".
3. Connect your recorder's AV2 IN/DECODER connector to the decoder's Euroconnector using a 21-pin SCART cable.

NOTES:

When connecting a satellite tuner...

- Connect the satellite tuner to the decoder ①, or if you don't have a decoder connect the satellite tuner directly to the vieo recorder ②.
- Set the AV2/DECODER switch on the rear panel to "AV2".
- To view a programme via the satellite tuner, select AU 2 mode by pressing TV PROG. until "AU 2" appears on the display panel.



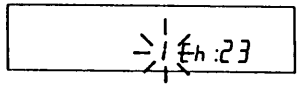
ENGLISH

TUNING IN SCRAMBLED CHANNELS

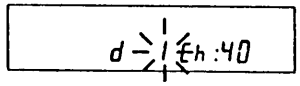
Preparation

- Turn on the TV.
- Select VIDEO channel (or AV mode).

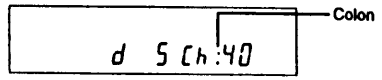
1. **Press OPERATE to turn on the recorder.**
2. **Press TV/VIDEO so that the VIDEO indicator is lit on the display panel.**
3. **Press CH SET/SEARCH until the display panel shows the following.**



4. **Press CH SET/SEARCH briefly to start automatic scanning for receivable channels.**
   - Automatic scanning stops when a broadcast is detected.
   - If the detected broadcast is not a scrambled broadcast, press CH SET/SEARCH and continue search until a scrambled broadcast is found.
5. **Press TV/VIDEO when a scrambled broadcast is detected.**



   - The programme will be descrambled. For normal (non-scrambled) broadcasts, do not press TV/VIDEO.
6. **Press numeric keys or turn the TV PROG. dial to select the channel position where you wish to store that scrambled broadcast.**



7. **Press STORE to store the channel.**
   - The colon will disappear when the scrambled broadcast is stored.
8. **Press Stop on the recorder to disengage the Channel Set mode.**

WATCHING SCRAMBLED CHANNELS

Preparation

- Turn on the TV.
- Select VIDEO channel (or AV mode).

1. Press TV/VIDEO to select the VIDEO mode.
2. Choose a scrambled channel using the Numeric keys or TV PROG. just as you would with regular stations.

Watching One Programme While Recording Another

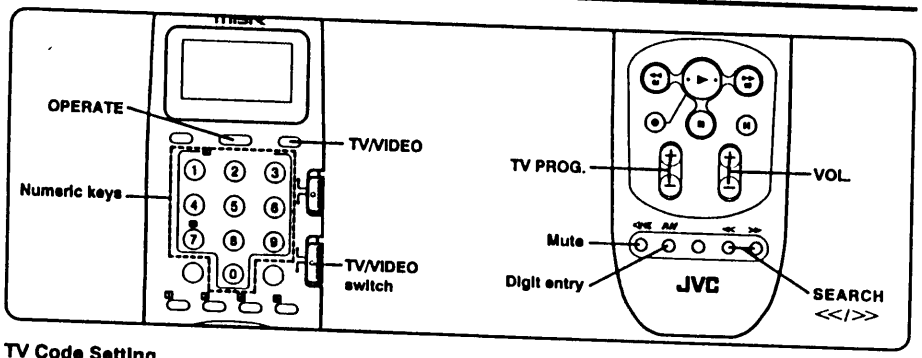
To watch a regular TV programme while recording a scrambled programme:

- Press the TV PROGRAM button on the TV's remote control and select the channel you want to watch.
- To watch the scrambled programme that is being recorded, press TV/VIDEO and select the VIDEO mode.

To watch a scrambled TV programme while recording a regular programme:

- Press the TV PROGRAM button on the TV's remote control and select the scrambled channel. After displaying a scrambled picture for a few seconds, the programme will become descrambled and a viewable picture will appear on the TV screen.

Using The Remote Control For TV Operation



TV Code Setting

Your remote control can operate the basic functions of your TV set. In addition to JVC televisions, other manufacturers' televisions listed on the right can also be controlled by setting the remote control to "TV". If your television is a JVC (Code 1), you don't have to set the TV code in step 2.

1. Set the TV/VIDEO switch to "TV".
2. While holding down the OPERATE button, press the numeric keys corresponding to the code number for your TV's brand.
   - Press OPERATE to turn the TV power on.
   - Press TV/VIDEO to switch the TV between TV and VIDEO (or AV) mode.
   - Press TV PROG. to select the TV's channel.
   - Press VOL. to adjust the TV's sound volume.
   - Press Mute to mute the TV's sound.
3. To operate your recorder, set the TV/VIDEO switch back to "VIDEO".

NOTE:

- The TV PROG. button does not function with televisions using Code 2.
- The TV/VIDEO button does not function with televisions using Code 3.
- With some televisions, the OPERATE button functions only to turn the TV power off, and the TV/VIDEO button functions only to switch the TV to the VIDEO (AV) mode.
- Whenever you replace batteries in the remote control, it is necessary to re-set the TV code if your television is not a JVC TV.

IMPORTANT
Although the provided remote control unit is compatible with JVC televisions, as well as many TV models manufactured by others, it is possible that the provided remote control will not work with your TV, or in some instances, will have limited function capability.

CODE	TV BRAND NAME
1	JVC
2	BRANDT, NORDMENDE, SABA, TELEAVIA, TELEFUNKEN, THOMSON
3	FERGUSON
4	PHILIPS
5	BLAUPUNKT, GRUNDIG
6	SONY
7	PANASONIC
0	GRAETZ, ITT, LUXOR, SALORA, SELECO

To Control Your Television With Additional Buttons

The numeric keys can also be used to select the TV's channel by setting the remote control to the TV mode.

1. Set the TV/VIDEO switch to "TV".
2. Use the numeric keys and the Digit entry button or the SEARCH <</>> buttons to select the TV's channel.
   - With televisions using Code 1, 3, 4, 6 or 7 the Digit entry button corresponds to the 1-digit/2-digit entry switching button (often labelled -/--) of your TV's remote control.
   - With televisions using Code 1, 5 or 0, the SEARCH << button corresponds to the 10 + button, and the SEARCH >> button, to the 20 + button of your TV's remote control.

NOTE:
The way these buttons are used is determined by your TV. Use these buttons as instructed for your TV's remote control.

Precautions

Please follow these safety precautions. Not doing so may result in damage to the recorder, remote control, or video cassette.

- **Avoid extreme heat and direct sunlight.**
- **Avoid extreme cold.**
- **Avoid extreme humidity.**
- **Avoid dust.**
- **Avoid places subject to vibrations.**
- **Avoid strong magnetic fields.**
- **Do not block the recorder's ventilation openings.**
- **Do not place anything heavy on the recorder or remote control.**
- **Do not place anything which might spill on top of the recorder or remote control.**
- **Do not place the recorder on cushions, pillows, or thick carpeting.**
- **Use the recorder in a stable, horizontal position only.**

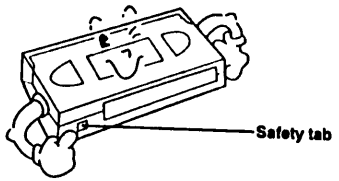
Beware of moisture condensation
Moisture in the air will condense on the recorder when you move it from a cold place to a warm place, or under extremely humid conditions — just as water droplets form on the surface of a glass filled with cold liquid. Moisture condensation on the head drum will cause damage to the tape. In conditions where condensation may occur, keep the recorder's power turned on for a few hours to let the moisture dry.

When transporting
- Be sure to remove cassette from recorder before packing.
- Avoid violent shocks to the recorder during packing and transport.

Place cassettes in cassette cases and store vertically.

Special Note On Video Cassettes

To prevent accidental recording on a recorded cassette, remove its safety tab. To record on it later, cover the hole with adhesive tape.



Specifications

ENGLISH

GENERAL

Power requirement	: AC 220 – 240 V~, 50/60 Hz
Power consumption	: 19 W
Temperature	
Operating	: 5°C to 40°C
Storage	: –20°C to 60°C
Dimensions (WxHxD)	: 360 x 94 x 348 mm
Weight	: 4.4 kg
Format	: VHS PAL standard
Maximum recording time (SP)	: 240 min. with E-240 video cassette
(LP)	: 480 min. with E-240 video cassette

VIDEO/AUDIO

Signal system	: PAL-type colour signal and CCIR monochrome signal, 625 lines/50 fields
Recording system	: Rotary two-head helical scan system with slant double-azimuth combination video heads
Signal-to-noise ratio	: 43 dB (Rohde & Schwarz noise meter)
Horizontal resolution	: 250 lines (260 lines with SQ activated)
Frequency range	: 70 Hz to 10,000 Hz
Input/Output	: 21-pin scart connector x 2
	: RCA connectors (VIDEO IN x 1, AUDIO IN x 1)

TUNER/TIMER

TV channel storage capacity	: 80 positions (+AUX position "AU")
Channel coverage	: VHF 47 – 89/104 – 300/ 302 – 470 MHz
	UHF 470 – 862 MHz
Aerial output	: UHF channel 36 (Adjustable 32 – 40)
Memory backup time	: Approx. 3 min.

ACCESSORIES

Provided accessories	: Aerial cable, Infrared remote control unit, "R6" battery x 2, AC power cord
Optional accessory	: PDC/VPS adapter VU-V115E

Specifications shown are for SP mode unless otherwise specified.
Design and specifications subject to change without notice.

SECTION 1
DISASSEMBLY

1.1 DISASSEMBLY

1.1.1 Top cover

1.Take Out 4 screws Ⓐ and a screw Ⓑ .
2.To remove the top cover,slide in direction of arrow and lift away.

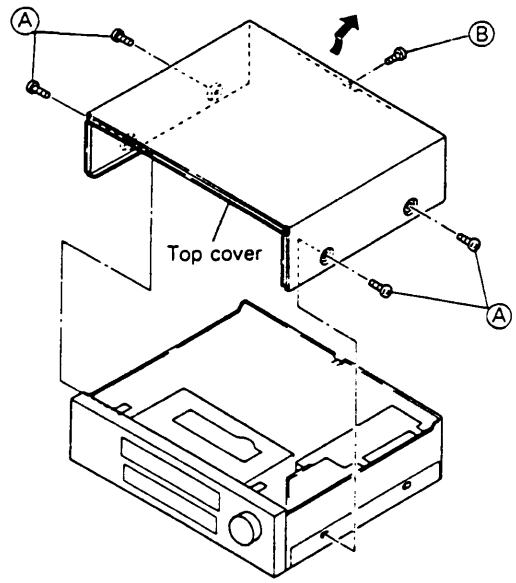


Fig. 1-1-1 Top cover

1.1.2 Front panel assembly

1.Remove the top cover.
2.Carefully disengage 2 tabs ⓐ of the Front panel assembly from the upper side of the chassis.
3.Pull the front panel assembly toward you to disengage 3 tabs ⓑ of the front panel assembly from the bottom of the chassis then disconnect a connector ⓒ.
4.Remove the front panel assemdly.

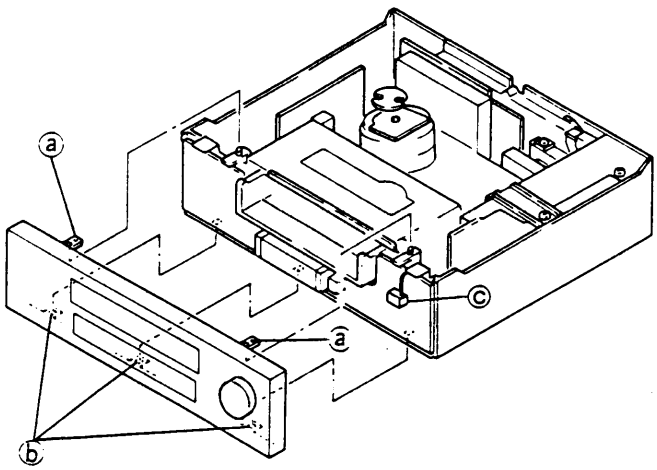


Fig.1-1-2 Front panel assembly

1.1.3 Bottom cover

1.Remove the top cover.
2.Disengage 9 claws ⓐ from the bottom of the chassis.
3.Disengage the bottom cover from the bottom of the chassis.

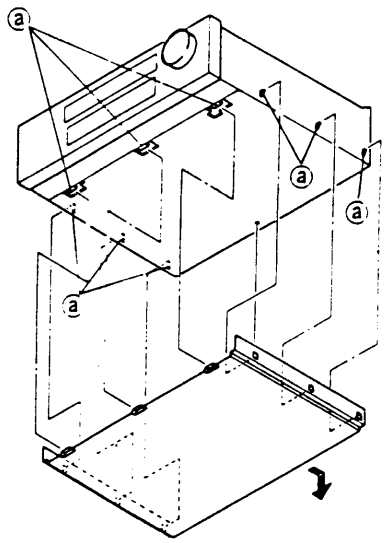


Fig.1-1-3 Bottom cover

1.1.4 FRONT board assembly

1.Remove the top cover and front panel.
2.Disengage 6 claws ⓐ from the chassis.
3.Disengage 6 claws ⓑ ,then remove the FRONT board assemby in direction of arrow.

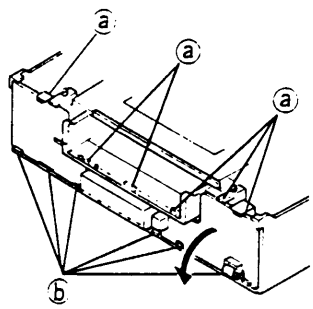


Fig.1-1-4 Front board assembly

1.1.5 SWITCHING REGULATOR board assembly

1. Remove the top cover.
2. Take out 3 screws Ⓒ and a screw Ⓓ, then remove the bracket.
3. Take out a screw Ⓔ.
4. Disengage 2 tabs ⓐ as shown in Fig.1-1-6 and remove the SWITCHING REGULATOR board assembly.

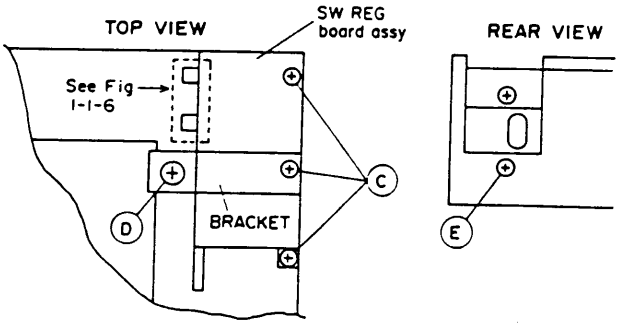


Fig.1-1-5 SWITCHING REGULATOR board assembly-(1)

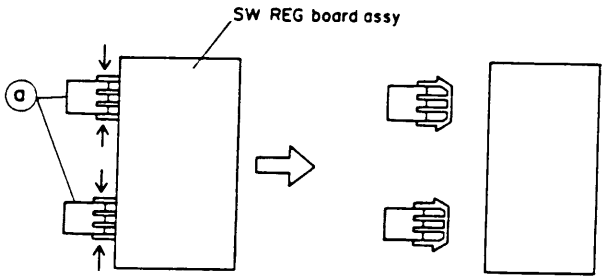


Fig.1-1-6 SWITCHING REGULATOR board assembly-(2)

1.1.6 Cassette housing assembly

1. Remove the top cover and front panel.
2. Take out 4 screws Ⓕ and 2 screws Ⓖ.
3. Disengage 2 claws ⓐ from the holder.
4. Remove the cassette housing assembly in direction of arrow.

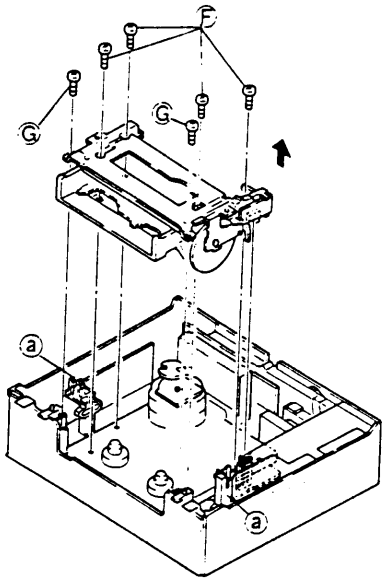


Fig.1-1-7 Cassette housing assembly

1.1.7 PRE/REC board assembly

1. Remove the top cover.
2. Take out 2 screws Ⓗ.
3. Disconnect connector CN502 from the PRE/REC board assembly
4. Remove the PRE/REC board assembly with the shield in the direction of arrow.

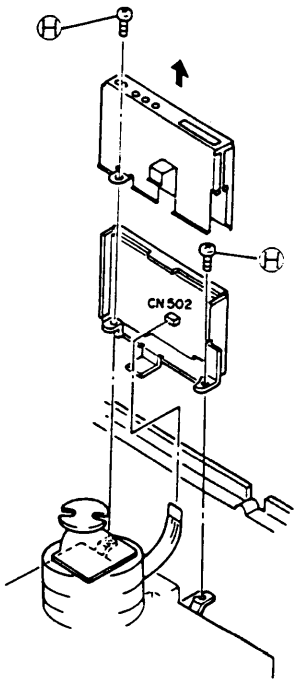


Fig.1-1-8 PRE/REC board assembly

1.1.8 Drum assembly

1. Remove the top cover.
2. Disconnect a connector of stator assembly.
3. Take out 3 screws Ⓙ and washer, then remove the cleaning brush and the drum assembly.

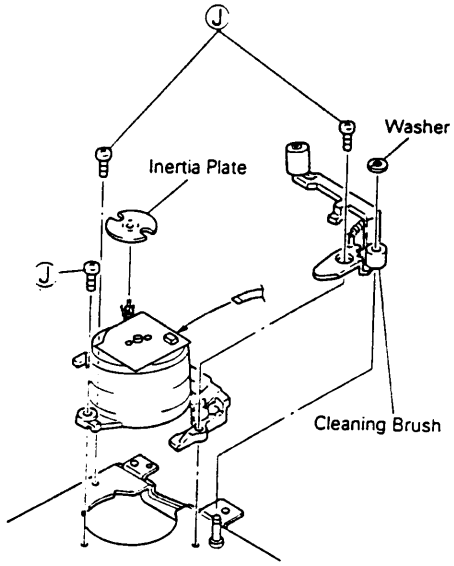


Fig.1-1-9 drum assembly

1.1.9 Main deck assembly

1. Remove the top cover, front panel, and cassette housing assembly.
2. Take out a screw Ⓚ and disconnect 3 connectors from the chassis.
3. Remove the main deck assembly in direction of arrow.

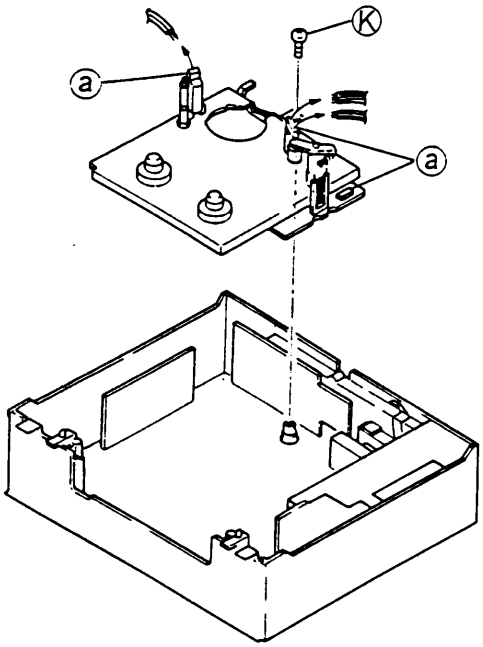


Fig.1-1-10 Main deck assembly

1.1.10 MAIN board assembly

1. Remove the top cover, front panel,SWITCHING REGULATOR, cassette housing and main deck.
2. Take out 1 screw Ⓛ and disengage 2 claws ⓐ from the chassis.
3. Remove the MAIN board assembly in direction of arrow.

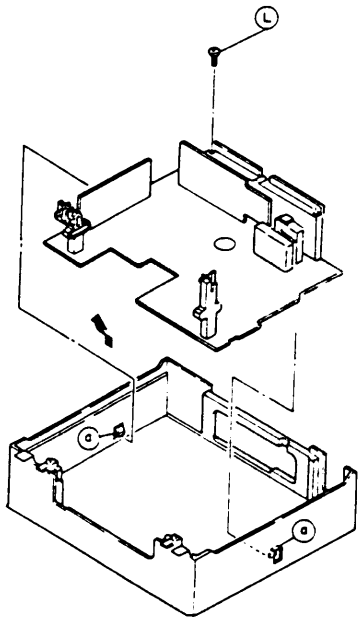


Fig.1-1-11 MAIN board assembly

1.1.11 Cassette housing installation

Note: ***Observe the mechanical phase and position (see figure)when installing the cassette housing assembly. If these are incorrect, the system will not operate properly even when tape is inserted.***

1. Check that the marks of the control cam and pinch roller cam are aligned. If necessary, turn the worm clutch by hand to adjust the position.

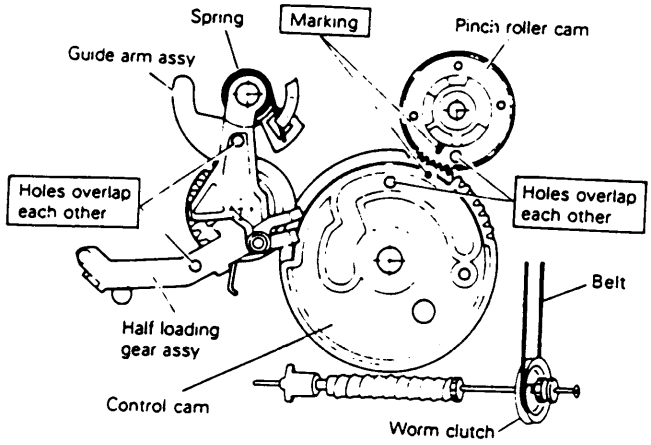
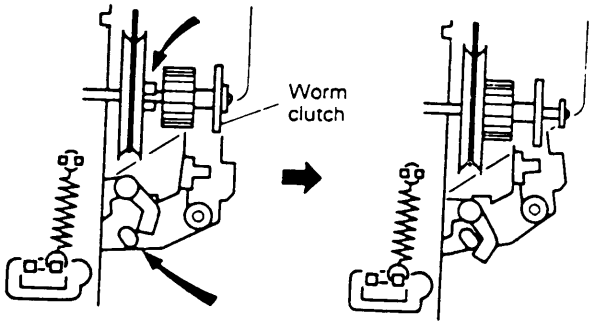


Fig. 1-1-12 Control cam and pinch roller cam position

2. Confirm that the clutch of the worm clutch assembly is locked. If necessary, engage the locked.



Flg.1-1-13(a) Not locked Fig.1-1-13(b) Lock engaged

3. Install the front panel as shown in Fig. 1-1-12 and re-engage the tabs. Supply power and use spare cassette to check for normal loading and eject operations.

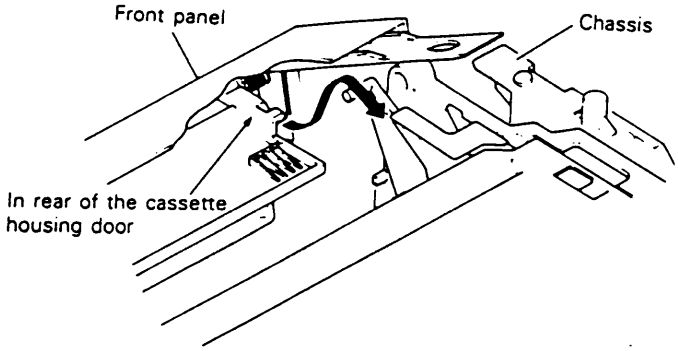


Fig.1-1-14 Cassette housing door

1.2 SERVICE POSITION -1

1. Remove the top cover, front panel and FRONT board assembly.
2. Take out 4 screws Ⓐ and a screw Ⓑ then remove the bracket.
3. Take out 2 screws Ⓒ , a screw Ⓓ and a screw Ⓔ.
4. Disengage 2 claws ⓐ from the chassis.
5. Remove the mechanism assembly(including cassette housing),MAIN board assembly and SWITCHING REGULATOR board assembly out of the chassis as shown in Fig.1-2-2.
6. Turn over the mechanism assembly and MAIN board assembly.
7. Connect the flat wire(CN1) of the FRONT board assembly to the MAIN board assembly.
8. Carry out checks & repairs as necessary as shown in.Fig.1-2-3.

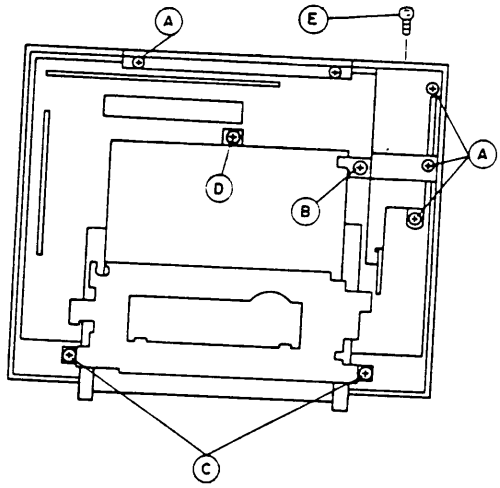


Fig.1-2-1

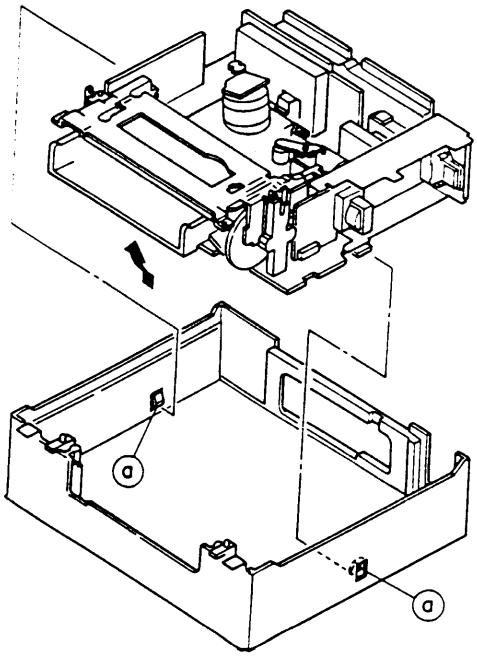


Fig1-2-2

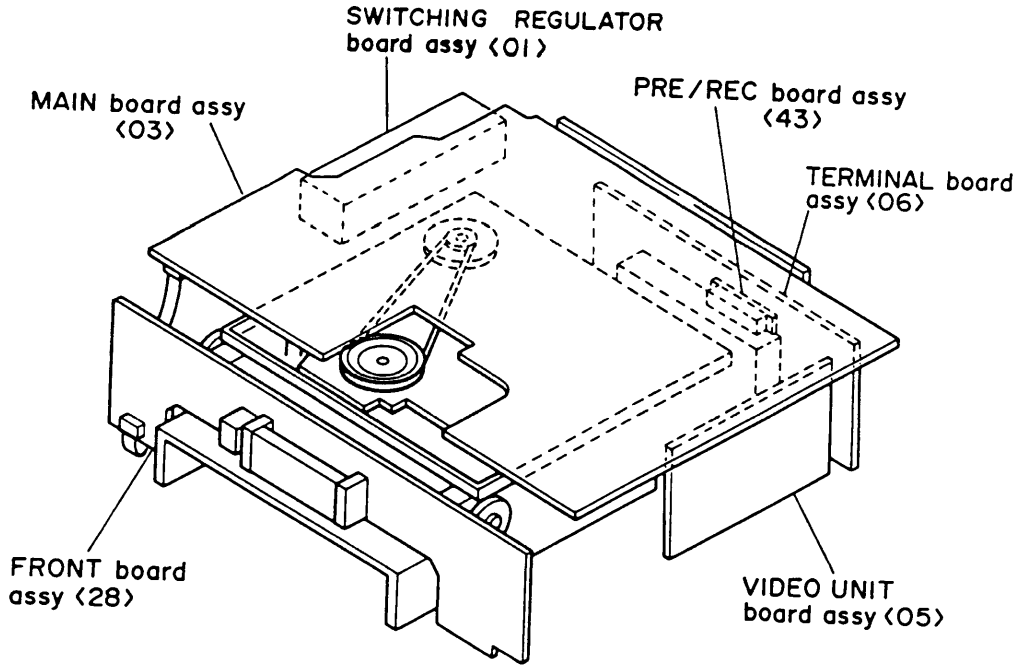


Fig.1-2-3

1.3 SERVICE POSITION -2

1.3.1 Connections for MAIN board and SWITCHING REGULATOR board assembly

1. After removing the SWITCHING REGULATOR board assembly from the chassis,connect the patch cord for check and repair as follows.

NO.	CONNECTION				DISCRIPTION	CABLE PART NO.
①	SW.REG board	CN1	←→	MAIN board CN801	Pin 11	PEMCJ0978-111

Table 1-3-1 Patch cord list

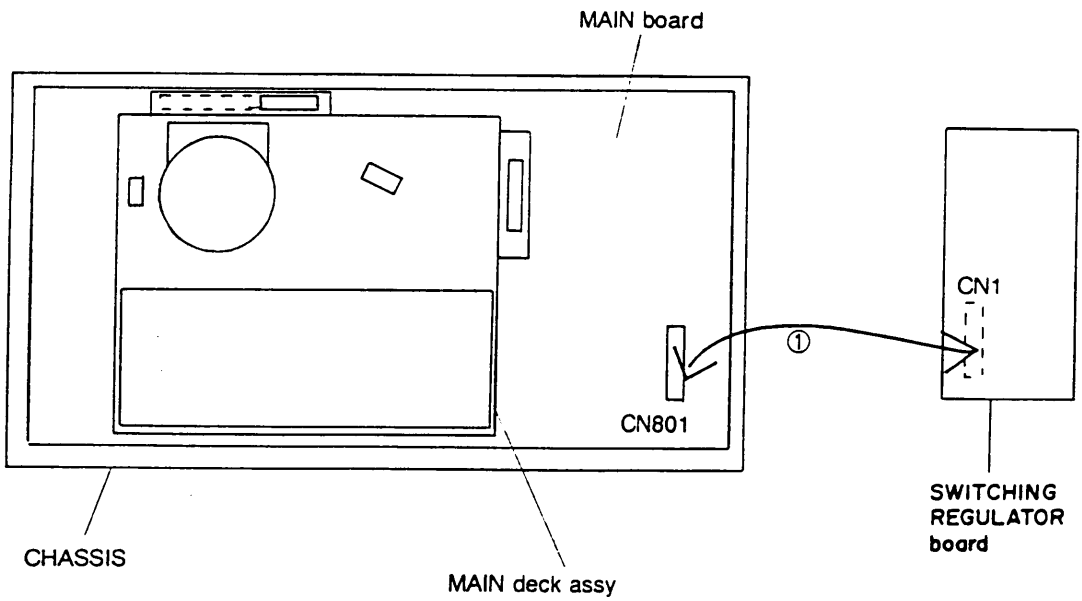


Fig. 1-3-1 Connections for patch cord

SECTION 2
MECHANISM ADJUSTMENT

2.1 PREPARATION

2.1.1 Precautions

1) Disconnect VCR from AC power before soldering.
2) Avoid imparting stress to wires when disengaging connectors.
3) Determine and correct the cause of difficulty before proceeding to adjustments. Do not disturb settings unnecessarily.
4) Use care not to damage tabs, claws, etc. during repairs.
5) Install the cassette housing assembly only when the mechanism is in the Eject or Stop mode position. In the Eject mode, the internal holder of the housing is fully raised. This is fully lowered in the Stop mode.
6) When installing the front panel assembly, be sure to engage the housing door with the door lever of the cassette housing assembly. If this is omitted, the door will not open at Eject and the cassette cannot be removed.
See Sec.1 DISASSEMBLY.

2.1.2 Check without cassette housing

Mechanism operations can be observed easily by removing the cassette housing assembly. Note the following.

1) Disable the photo transistor sensor (END SENSOR) on the main-deck by applying an opaque cover.
2) Connect pins 2 and 3 of Main board connector CN601.
3) Select the desired modes with the operation buttons. However, notice that without tape, setting for the reverse direction modes produces the Stop mode after a few seconds due to absence of the reel sensor output.

2.1.3 Manual removal of loaded tape

In event of failure which leaves the tape in the loaded position, remove it by the following procedure.

1) Take off the top cover and main deck assy in order to wind the tape on the reel.
See Sec.1 DISASSEMBLY.
2) Turn the mode motor belt by hand in the unloading direction to return the loading posts to the stop position, refer Fig. 2-1-1.

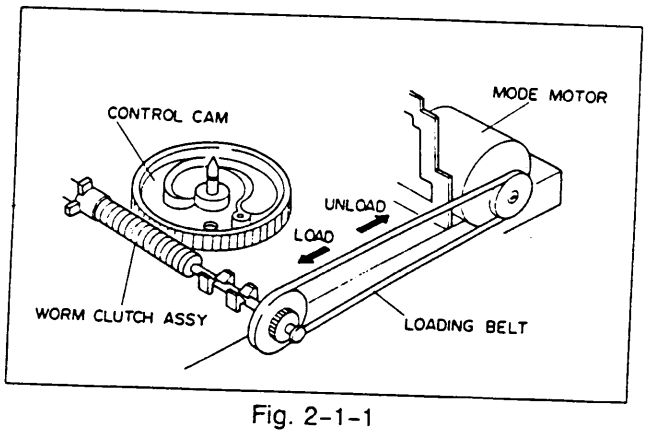


Fig. 2-1-1

3) From the bottom, turn the clutch unit by hand to wind the slackened tape onto the reel.

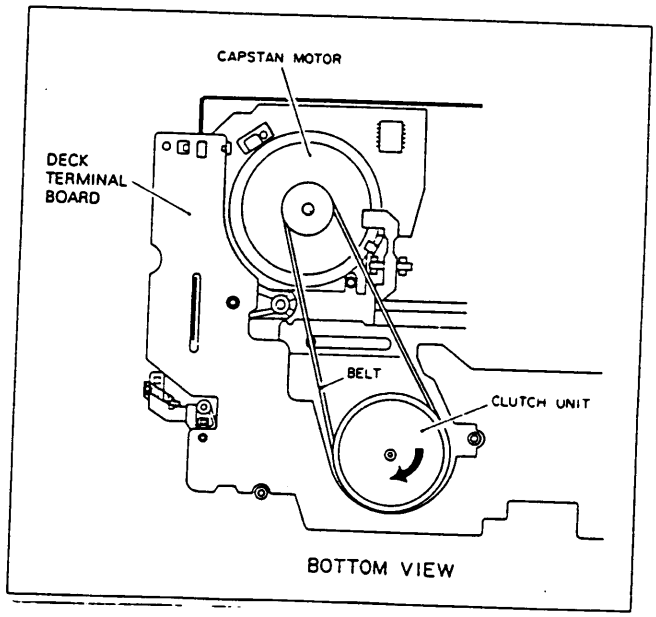


Fig. 2-1-2

4) Turn the mode motor further to where the cassette holder begins moving in the unloading direction, then remove the cassette tape.

Note: *Turn the mode motor and clutch unit alternately in order to avoid damaging the tape. It is important to avoid scratching the tape in the mechanism.*

2.1.4 Test equipment

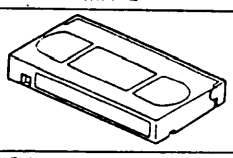
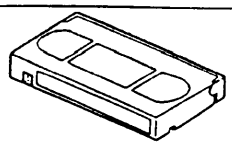
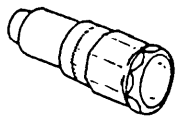
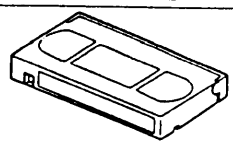
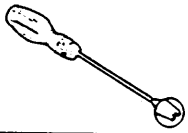
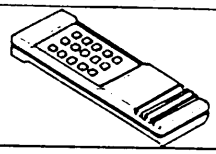
Alignment tape (SP) MH-2	Alignment tape (EP) MH-2L	Torque gauge PUJ48075-2	Back tension cassette gauge PUJ48076-2
			
A/C head positioning tool PTU94010	**Roller driver PTU94002**	**Presetting unit PTU94008**	
			

Table 2-1-1

2.2 MAIN MECHANISM PARTS

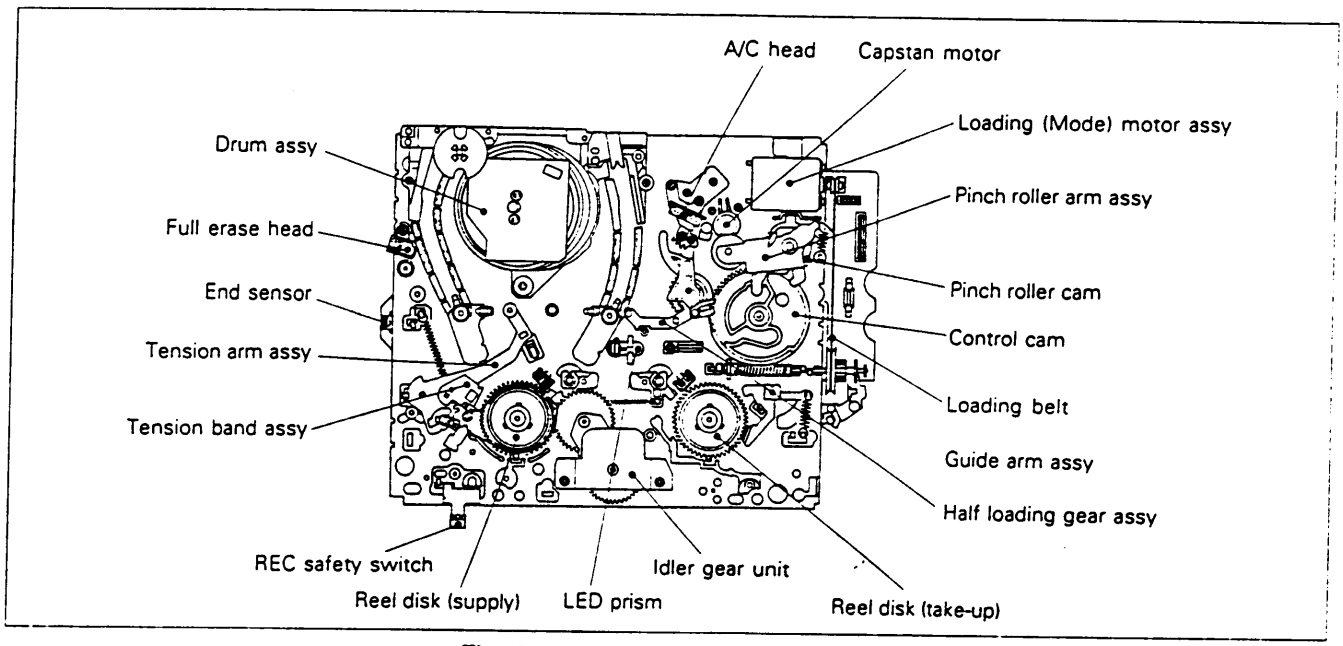


Fig. 2-2-1 Top view of main-deck

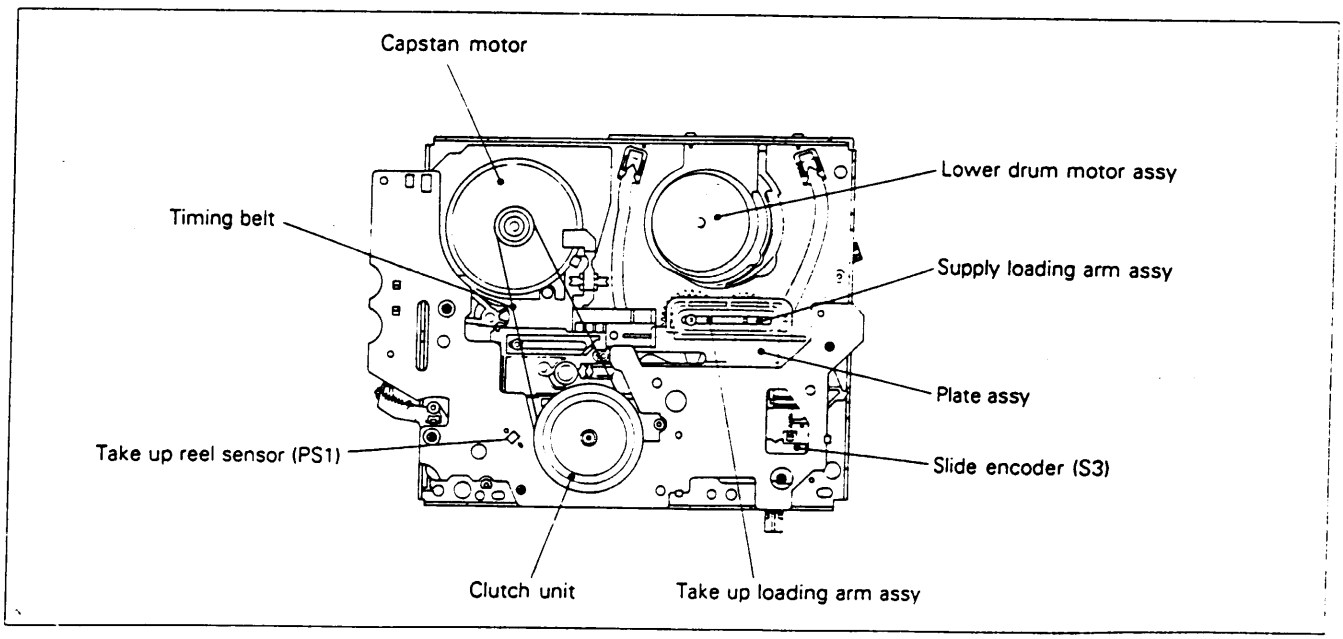


Fig. 2-2-2 Bottom view of main-deck

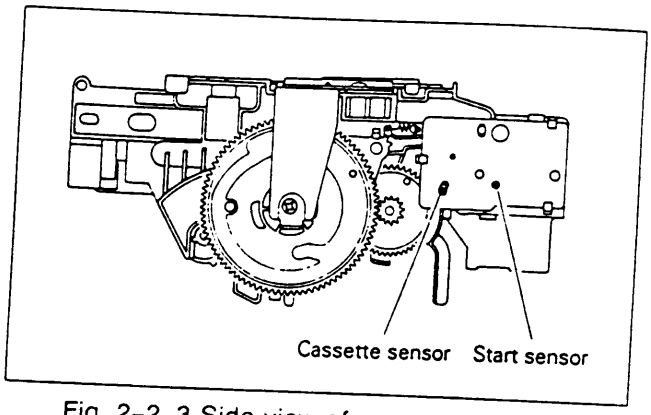


Fig. 2-2-3 Side view of cassette housing

2.2.1 Cleaning

Periodic cleaning of the tape transport system is desirable, but ordinarily not feasible in practice. Therefore, perform cleaning when a set is brought in for repairs or maintenance. Contamination of the video heads, tape guides and brushes can detract from playback picture quality and in extreme cases, even damage the tape. For cleaning, use a fine-mesh cotton cloth (about the texture of a white dress-shirt) moistened in alcohol.

- To clean the video heads, press the moistened cloth gently against the upper drum with finger-tip and turn the drum by hand.
- Do not use a vertical stroke, as this may damage the heads.

2.2.2 Lubrication

Oil and grease do not normally require periodic replenshing. Apply only when replacing lubricated parts (also clean and replace lubrication of mating parts if soiled).
For parts and points to apply oil and grease, refer to the exploded views of the mechanism assembly.
Before oiling, clean with alcohol.
Apply one or two drops of oil.
Avoid excess oil.

1) Table 2-2-1 indicates the oil and grease used in this set. Use these or recommended locally available equivalents.

Category	Part No.
Oil	COSMO-HV56
Grease	KANTO-G-31KAV

Table 2-2-1

2) Grease is not required for a replacement cassette housing assembly, as this has been applied at the factory.

Note: *Stir grease that has been stored for an extended period.*

2.3 INSPECTION AND MAINTENANCE

This product employs rotary and moving parts which wear out in the course of usage. Periodic inspection, cleaning, lubrication and maintenance are therefore important for ensuring maximum performance. Worn parts must also be replaced as and when required.

2.3.1 Suggested servicing schedule for main components

The following table indicates the suggested period for such service measures as cleaning, lubrication and replacement. In practice, the indicated periods will vary widely according to environmental and usage conditions. However, the indicated components should be inspected when a set is brought for service and the maintenance work performed if necessary.
Also note that rubber parts may deform in time, even if the set is not used.

System	Parts Name	Operation hours						
		250	500	750	1000	1250	1500	2000
Tape Transport	Upper drum assy	★	★	★	○	★	○	○
	A.C head	★			○			○
	Pinch roller arm assy	★	★	★	★	★	★	★
	Full erase head							
	Tension arm assy							
	Lower drum assy							
	Capstan motor (Shaft)							
	Half loading gear assy							
	Guide arm assy							
Drive	Capstan motor							○
	Loading belt			○				○
	Mode motor assy			○				○
	Reel disk (Supply)			○				○
	Reel disk (Take-up)			○				○
	Clutch assy			○				○
	Worm clutch assy							○
	Plate assy							○
Others	Brush assy			○				○
	Tension band assy			○				○

★ : Cleaning
○ : Inspection or Replacement if necessary

Table 2-3-1

2.4 MAIN PARTS REPLACEMENT AND ADJUSTMENT

2.4.1 Stator assembly

1) Take out 2 screws (A).
2) Raise the Stator Assembly in the direction indicated by the arrow to remove it (also remove the Inertia Roller).
3) Remove the flat cable.
4) To reinstall, first secure the flat cable, then insert 2 screws (A).
5) After reinstalling, be sure to perform switching point adjustment.

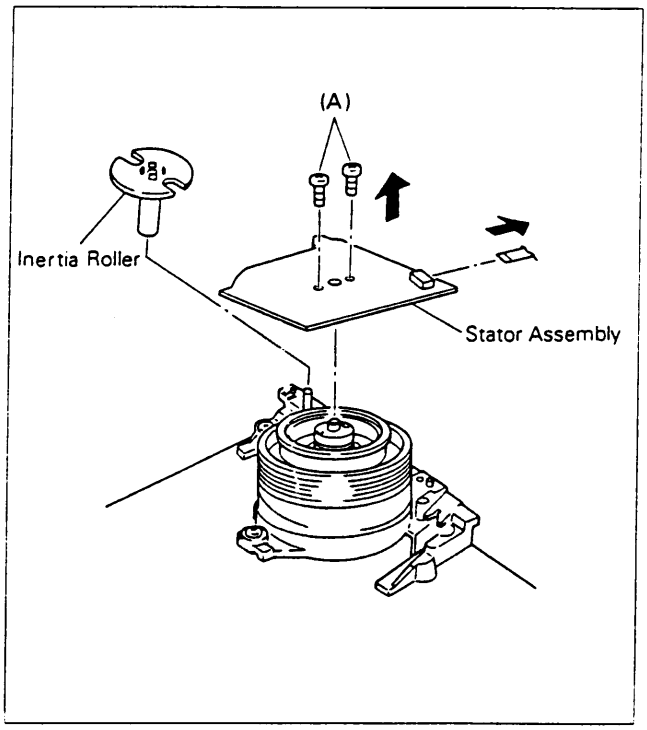


Fig. 2-4-1

2.4.2 Rotor assembly

1) Remove the Stator Assembly.
2) Take out 2 screws (B) and remove the Rotor Assembly.

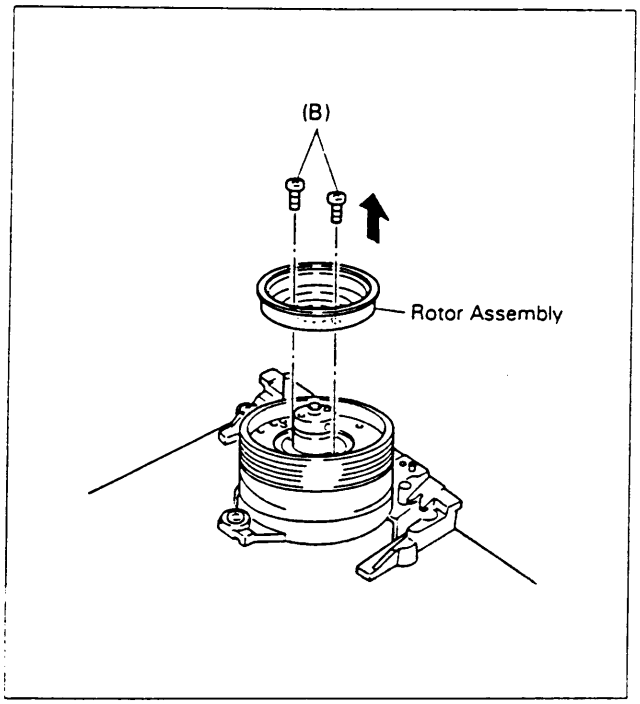


Fig. 2-4-2

Note: *A normal picture will not be obtained unless the phase is properly aligned when installing the Rotor Assembly. Also note there are three types of Rotors.*

3) Align the Upper Drum and Rotor Assembly phase as indicated in Fig. 2-4-3.
4) Overlap holes (a) of the Upper Drum with holes (b) of the Rotor Assembly (align holes in 3 locations) and secure with 2 screws (B) (see Fig. 2-4-3).

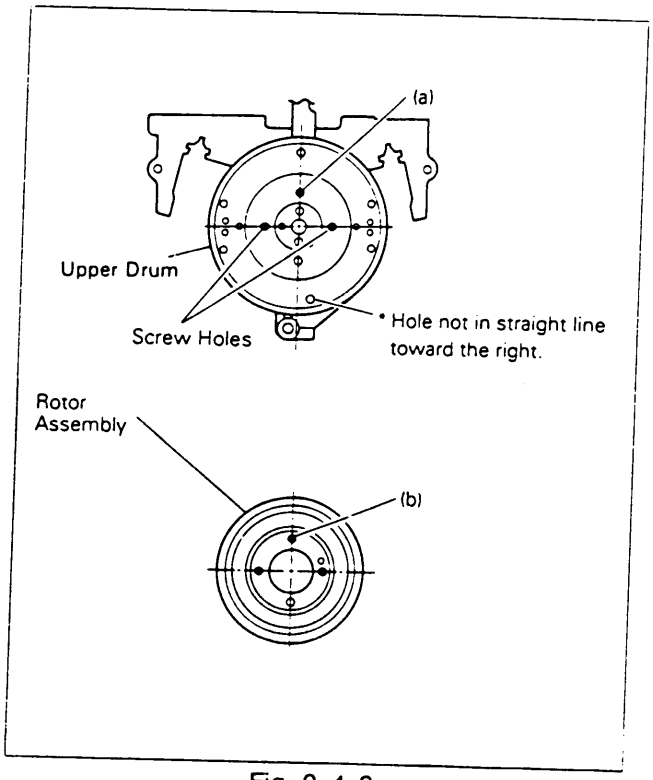


Fig. 2-4-3

2.4.3 Drum subassembly

1) Disengage the PRE REC AMP board connector and flat cable.
2) Take out 3 screws (C) and remove the Drum Subassembly.

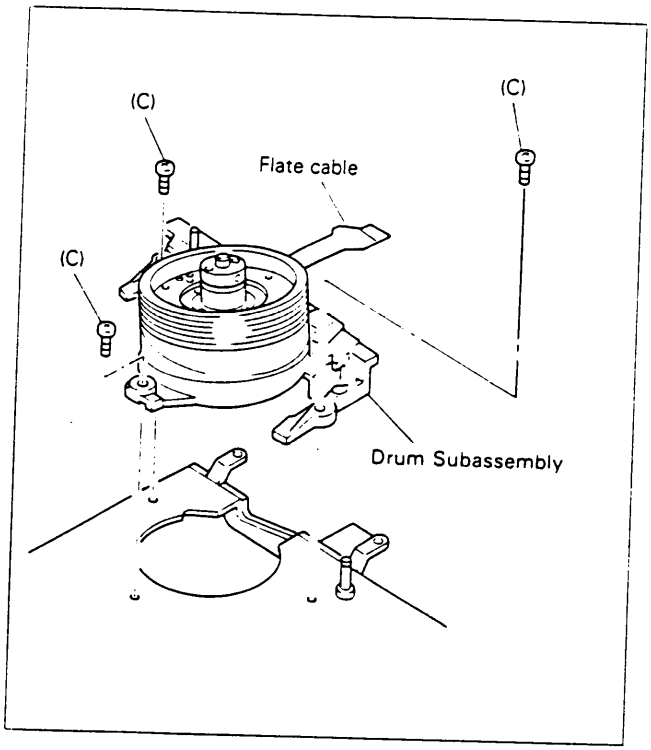


Fig. 2-4-4

2.4.4 Upper Drum assembly

1. Removal

1) Remove the Stator and Rotor Assemblies.
2) Use a 1.5 mm hexagonal wrench to loosen the Collar Assembly screw and remove the Collar Assembly.
3) Remove the Upper Drum Assembly and use tweezers to remove the Washer.

Note: ***If the Brush is replaced, do not apply the grease to the contacts.***

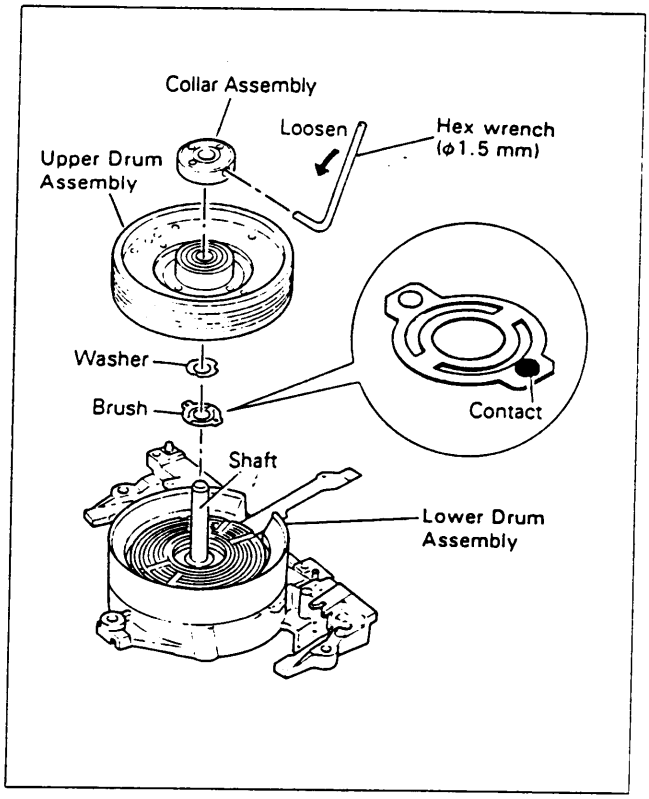


Fig. 2-4-5

2. Installation

1) Use an air brush to clean the Lower Drum Assembly and the coil section of the new Upper Drum Assembly.
2) Set a new Washer on the Drum shaft (see Fig. 2-4-6).

Note: *Be sure to use the new Washer supplied with the replacement Upper Drum Assembly.*

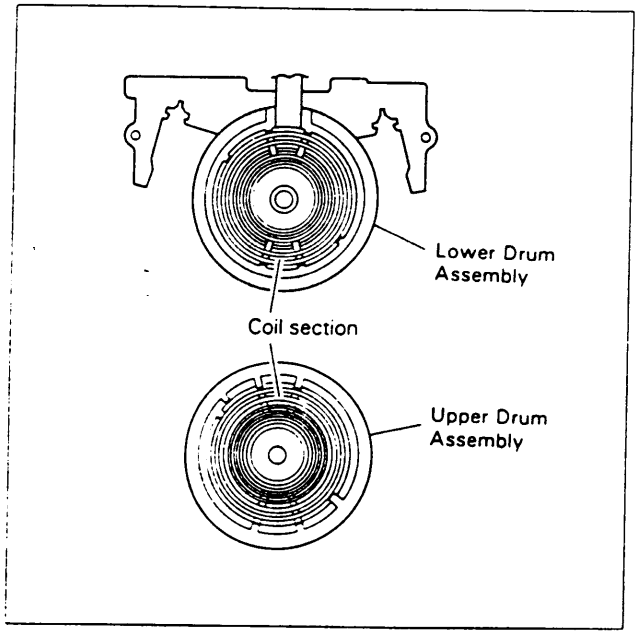


Fig. 2-4-6

3) Note the top and bottom of the Collar Assembly and determine the position as indicated in Fig. 2-4-7.

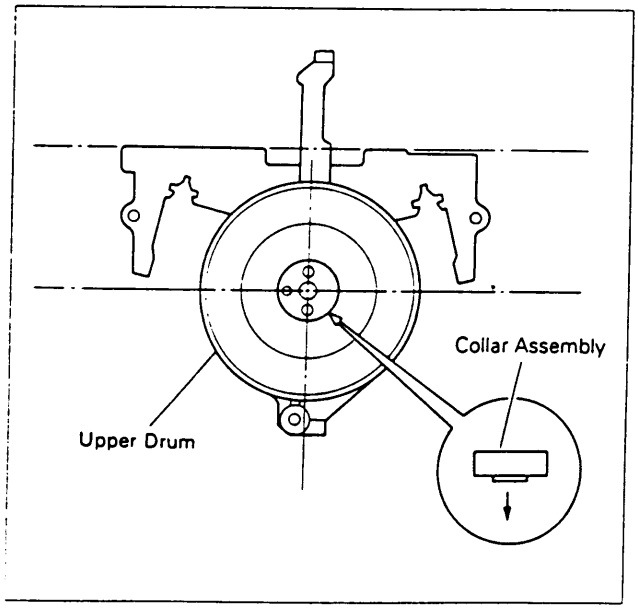


Fig. 2-4-7

4) While pressing the Collar Assembly evenly from above with the fingertips, secure the hexagonal screw.

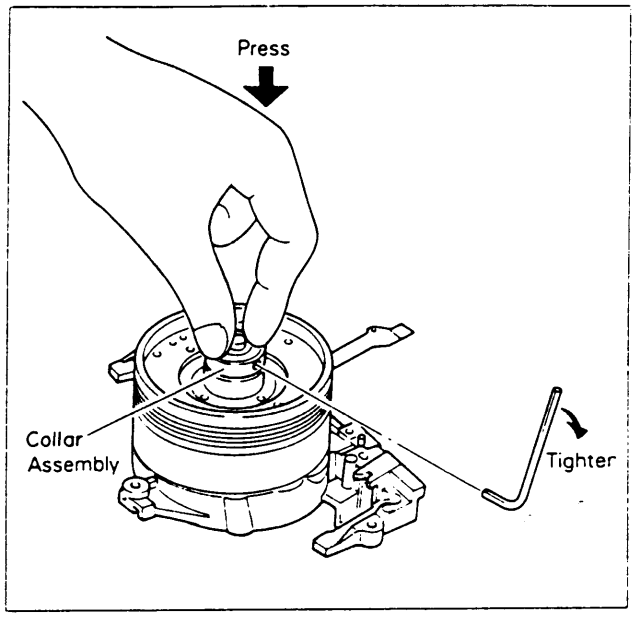


Fig. 2-4-8

5) After installing, gently turn the Upper Drum by hand and confirm normal rotation.
6) Install the Rotor and Stator Assemblies.
7) Clean the Upper and Lower Drum Assemblies and perform the following adjustments;

- Switching Point Adjustment
- Interchangeability Adjustment (be sure to check EP mode)
- Recording color level Adjustment

2.4.5 Tension arm positioning

1) Remove the cassette housing, set the playback mode.
(Refer to 2.1.2 Check without cassette housing)
2) Turn the eccentric adjust pin to position the mark of the chassis with the tension arm tip as shown Fig. 2-4-9.

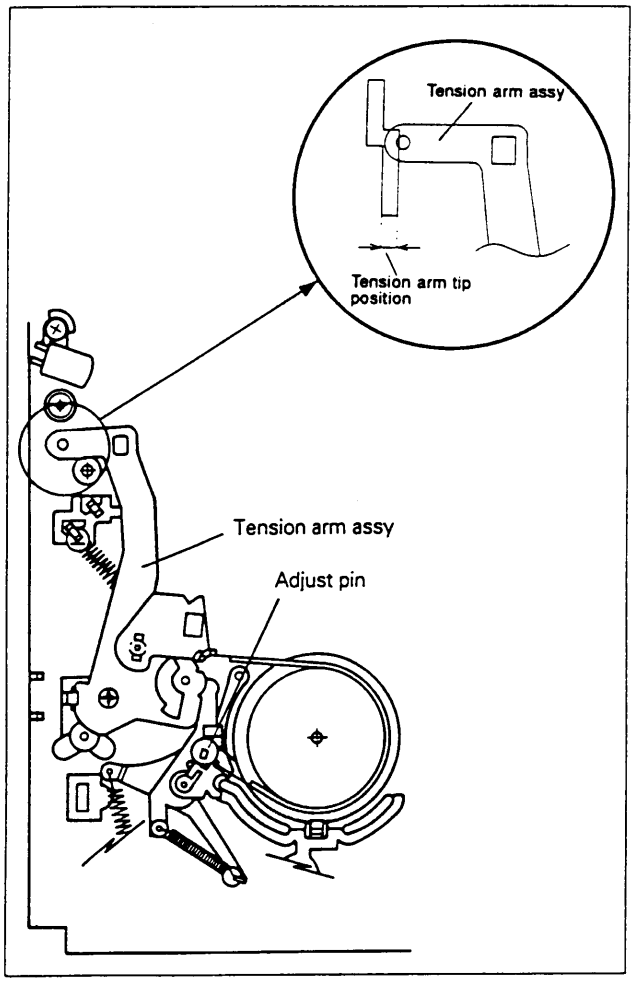


Fig. 2-4-9

Note: *Normally, if the tension post position is properly adjusted, the back tension will assume the correct value. Use the back tension cassette gauge and confirm playback tension is 35 g-cm to 48 g-cm (13.8 g-inch to 18.9 g-inch).*

2.4.6 Pinch roller cam position

1) Set the mechanism to the eject mode (cassette holder is locked in eject position).
2) Install the pinch roller cam so the largest hole near the gear teeth is aligned with the hole on the chassis.
3) Set the control cam on the deck with the hole in the groove aligned with the hole on the chassis. Observe that the small hole on the control cam and the mark on the pinch roller cam are aligned. (If the control cam does not fit readily, shift the loading arm and plate assembly within the range of mechanical play.)
4) Install the half-loading gear assembly with the hole aligned with the hole on the chassis. Secure with split washer.
5) Install the guide arm assembly with the hole aligned with hole on the chassis. Engage the spring properly.

Note: *This is the correct mechanical alignment to install the cassette housing. The cassette housing should also be in the eject position.*

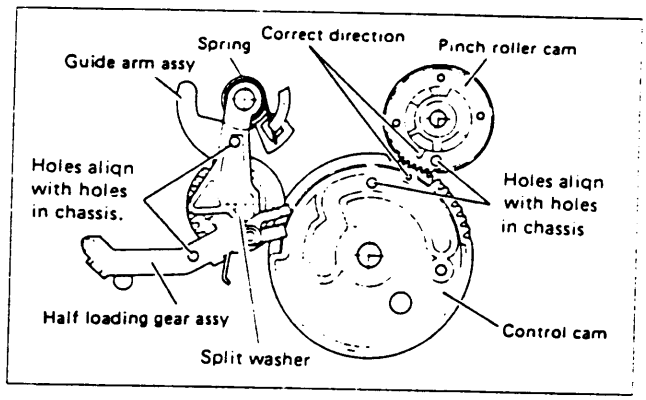


Fig. 2-4-10

2.4.7 Audio/control head height

1) Adjust the 3 screws (screw ①, ②, ③ in Fig. 2-5-1) to set the audio/control head height to 6.6 mm (0.26 in). Adjust all screws equally.
2) Perform interchangeability adjustments to obtain the specified control pulse and audio signal levels.

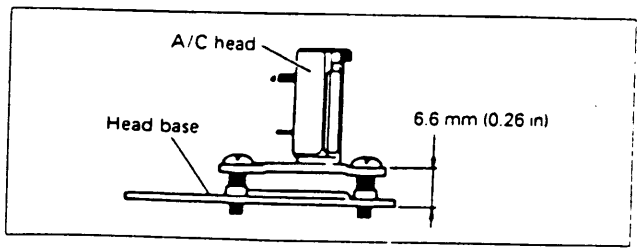


Fig. 2-4-11

Notes:
- *It is very important to correctly adjust the control pulse and audio signal in addition to the mechanical tape path.*
- *Perform interchangeability adjustments after electrical adjustments.*

2.4.8 Loading arm and plate assembly position

1) Set for Eject mode and remove the deck terminal board.
2) Check that the preset hole of the plate assembly is in the preset position. Temporarily insert a 3 mm (0.12 in) screw to hold the position.
3) By hand, hold the loading arms in the unloading (inner) position and set the plate assembly from above.
4) Install Red and White split washers. Remove temporary screw.
5) Move the mode motor belt by hand and confirm mechanism operation.

Note: *Observe that the brake assembly pin is engaged with the plate assembly groove.*

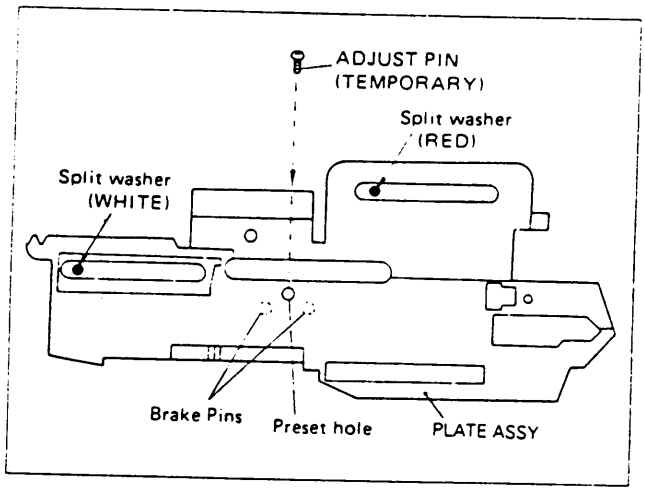


Fig. 2-4-12

2.4.9 Reel disk height

1) Measure the height of the reel disk above the main chassis.
2) Add or remove washers at the bottom of the reel disk to adjust for 12 mm (0.47 in). See Fig. 2-4-13.

Note: *This adjustment is normally not needed. Perform after replacing the reel disk.*

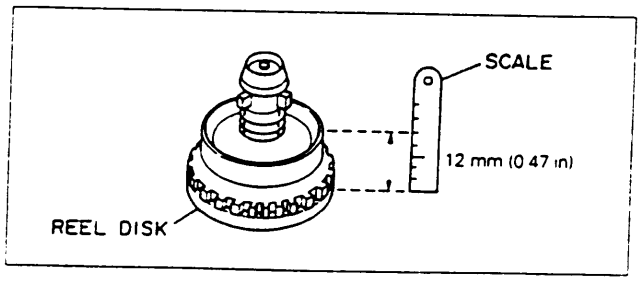


Fig. 2-4-13

2.5 TAPE INTERCHANGEABILITY ADJUSTMENT

Note: *This adjustment is extremely important. However, it is normally not required during routine service. Perform only after replacing major components (A/C head, drum assembly, etc.).*

2.5.1 Height and azimuth adjustment of A/C head

1) Connect the oscilloscope to the audio output jack on the rear of the deck.
2) Play back the stairstep portion (6 kHz, Mono) of the alignment tape.
3) Adjust Black Screw ② on the head base in Fig. 2-5-1 so that the output level is at a maximised.
4) Readjust Screw ① shown in Fig. 2-5-1 for maximum output.

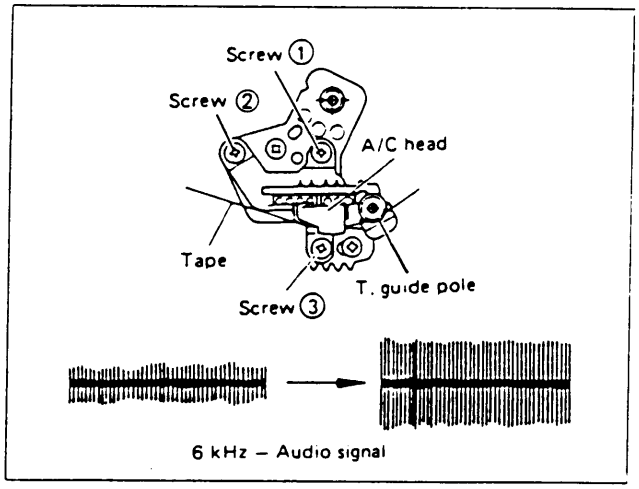


Fig. 2-5-1

2.5.2 Horizontal Position adjustment of A/C head

1) Play back the stairstep portion of the alignment tape.
2) Connect the oscilloscope to TP506 (PB FM) on the PRE/REC AMP board. Use TP511 (DRUM FF) as a trigger. Confirm that the FM envelope appears, as in Fig. 2-5-4.
3) Set the neutral manual tracking position, by simultaneously press of the (+) and (–) tracking buttons.
4) If adjustment is required, slightly loosen screws ④ and ⑤. Set A/C head positioning tool on the A/C head adjusting boss as shown in Fig. 2-5-2.
5) Turn the tool first to position the A/C head fully toward the capstan. Then gradually return it toward the drum and stop at the position of maximum FM waveform output level as shown in Fig. 2-5-4.
6) Tighten screw ⑤. Remove the tool and tighten screw ④.
7) Eject the tape and then re-insert again. Playback the Alignment Tape. Set the neutral manual tracking position. Push the tracking (+) button (count the number of pushes) until the maximum envelope is reduced to 1/2. Eject the tape and re-insert it again. Playback the Alignment Tape. Set the neutral manual tracking position. Push the tracking (–) button (count the number of pushes) until the maximum envelope is reduced to 1/2.
8) Confirm that the number of pushes are equal.

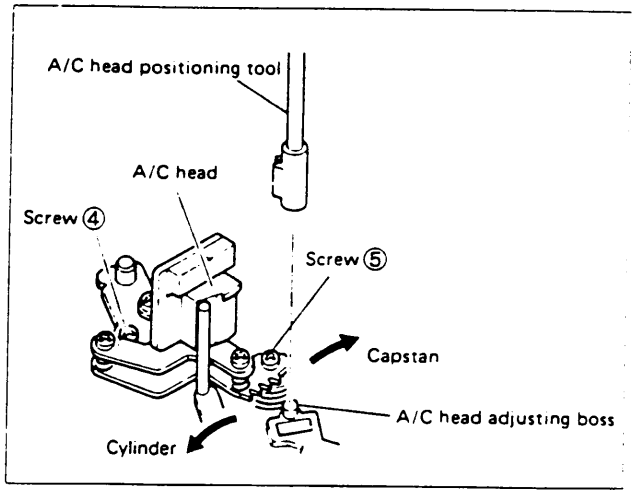


Fig. 2-5-2

2.5.3 Playback tracking

This is the most important adjustment. If incorrect, proper tracking will not be obtained in recording and playback.
Other problems that may occur are noise in parts of the picture, poor color reproduction and picture instability.

1) Play back the stairstep portion of the alignment tape.
2) Connect the oscilloscope to TP506 (PB FM) on the PRE/REC AMP board. Use TP511 (DRUM FF) as a trigger. Confirm that the envelope appears, as in Fig. 2-5-4.
3) Operate the tracking adjustment (press the tracking buttons during playback) and set for maximum playback envelope waveform.
4) If adjustment is required, first slightly loosen the set screw located at the bottom of the guide rollers. Using the guide roller adjustment tool, adjust the supply and take-up guide rollers (refer to Fig. 2-5-3) to obtain the correct waveform. Refer to Fig. 2-5-5.

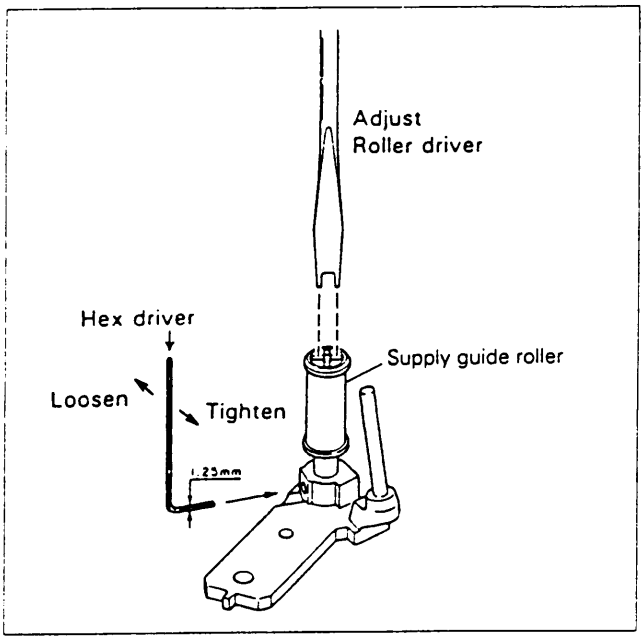


Fig. 2-5-3

5) By pushing the tracking buttons several times, vary the FM waveform output from maximum to minimum (and vice versa) gradually, and confirm that the variation proceeds in a flat shape, as in Fig. 2-5-6.
6) If the FM waveform varies and is not mostly flat, tweak the height of guide roller(s) until the FM waveform is as flat as possible.
7) Eject a tape and then playback tape again, since the height of guide rollers may move during adjustment. Confirm, when pushing the tracking (+) and (-) buttons, FM waveform variation is always flat.
8) After adjustment, confirm that the tape wrinkling does not occur at the roller upper or lower limits, as in Fig. 2-5-7.
9) Perform step 2.5.1 and 2.5.2.
10) Acceptable level difference between channel 1 and 2 is 5db. (See Fig. 2-5-8)

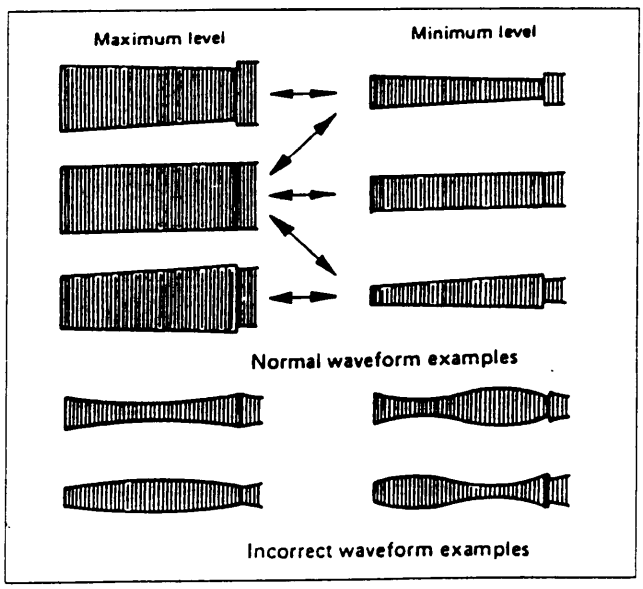


Fig. 2-5-4

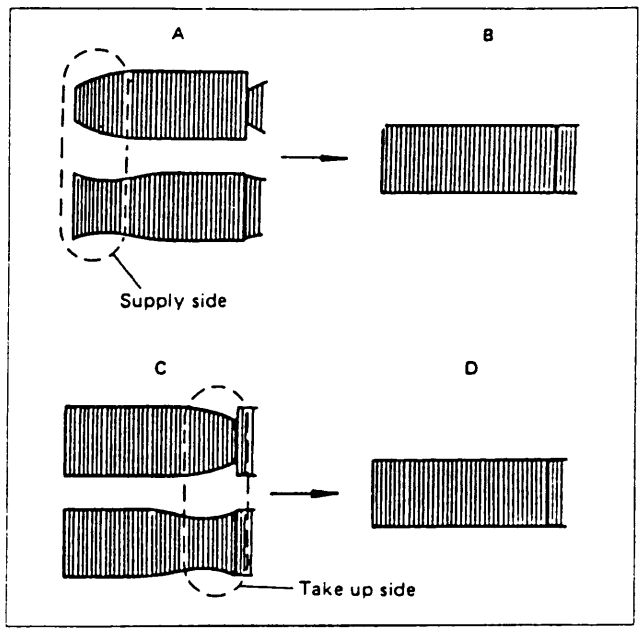


Fig. 2-5-5

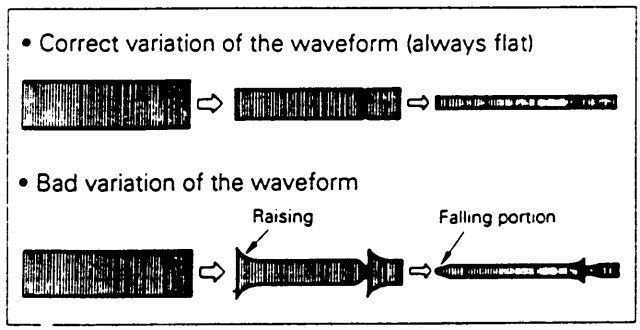


Fig. 2-5-6

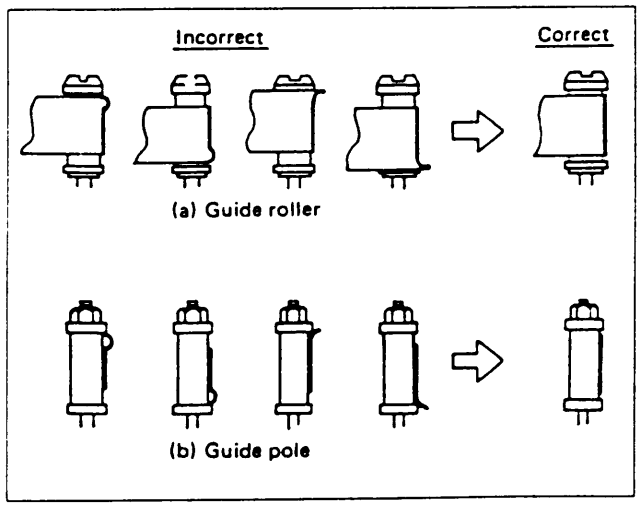


Fig. 2-5-7

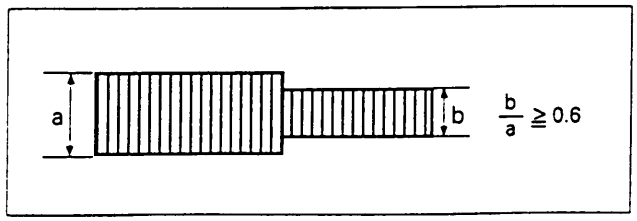


Fig. 2-5-8

SECTION 3
ELECTRICAL ADJUSTMENT

3.1 DECK SECTION ADJUSTMENT

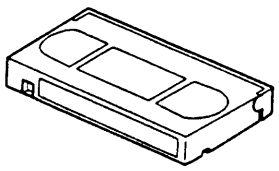
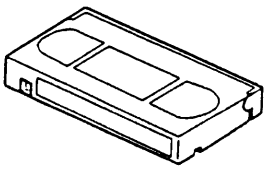
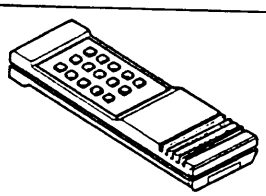
3.1.1 PRECAUTION

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipments is available.

1. Required test equipment

1. Colour television or monitor
2. Osciloscope: wide-band, dual-trace, triggered delayed sweep
3. Frequency counter
4. Digital voltmeter
5. Signal generator: RF/IF sweep/maker
6. Signal generator: PAL colour bar, stairstep
7. Recording tape

2. Required adjustment tools

Alignment tape (SP) MH-2	Alignment tape (LP) MH-2L
	
Presetting unit PTU94008	*SMC replacement tools YTU94038C
	

Note:** ***It is convenient for replacing chip parts.

3. Colour bar signal, colour bar pattern and video sweep signal

- Colour bar signal of pattern generator

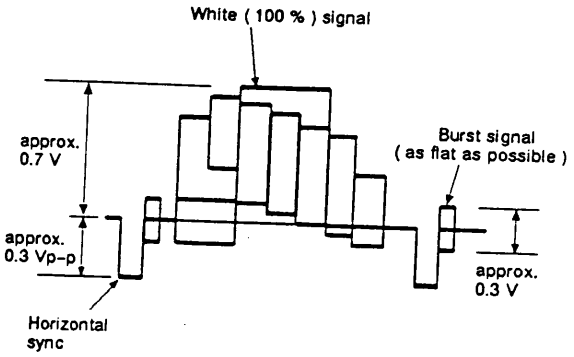


Fig. 3-1-1 Colour bar signal of pattern generator

- Colour bar signal

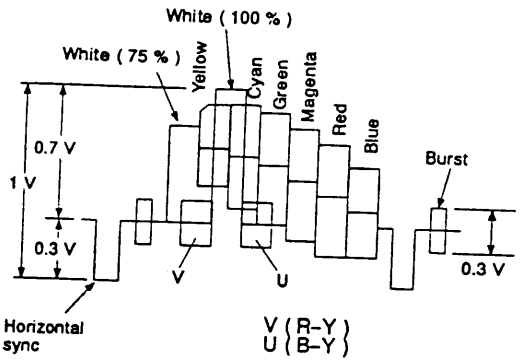


Fig. 3-1-2 Colour bar signal waveform

- Colour bar pattern

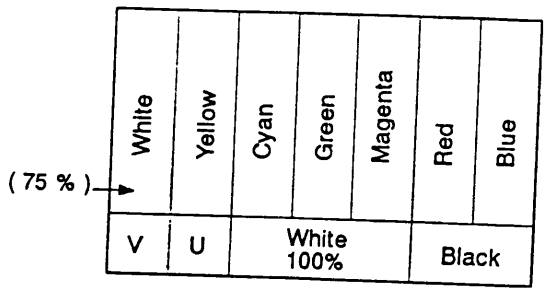


Fig. 3-1-3 Colour bar pattern

- Video sweep signal

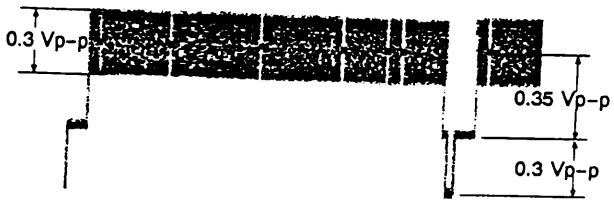


Fig. 3-1-4 Video sweep signal

3-1

3.1.2 SWITCHING REGULATOR CIRCUIT

Note: *Unless otherwise specified, all measurement points and adjustment parts are located on the MAIN BOARD.*

1. 5V DC output voltage

Signal	•TUNER
Mode	•SP •REC
Equipment	•Digital voltmeter
Measurement point	•TP802 (SWD 5 V) •TP801 (GND)
Adjustment part	•R805 (SWD 5 V)
Specification	•5.2 ± 0.1 V DC

1) Connect a digital voltmeter to TP802 (SWD 5V) and TP801 (GND).
2) Adjust R805 for 5.2 ± 0.1 V DC.

3.1.3 SERVO CIRCUIT

Note: *Unless otherwise specified, all measurement points and adjustment parts are located on the MAIN BOARD.*

1. PB switching point

Signal	•Alignment tape (MH-2) •Stairstep
Mode	•PB •Digital tracking OFF
Equipment	•Oscilloscope
Measurement point	•JA701 pin 19 (VIDEO OUT) (TERMINAL BOARD)
Trigger slope (-)	•TP511 (DRUM FF) (PRE/REC AMP BOARD)
Adjustment tool	•Presetting unit [PTU94008]
Specification	•6.5 ± 0.5 H

Note: • *Set VCR to the mode A by remote controller.*
• *Use only buttons "E" and "F". Depressing other buttons during adjustment may cause adjustment errors.*

1) Connect an oscilloscope to JA701 pin 19 and external trigger from TP511 (negative slope).
2) Playback the stairstep signal of the alignment tape.
3) Set the tracking control to the centre position by simultaneously pressing the (+) and (-) buttons.
4) Adjust by pressing "E" (+) or "F" (-) buttons of the presetting unit for position the trigger point 6.5 ± 0.5 H from V.sync.

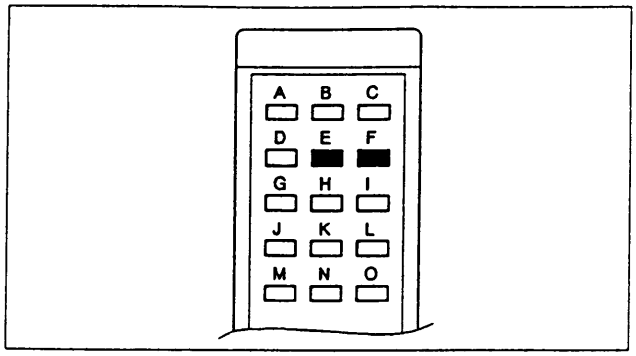


Fig. 3-1-5 Presetting unit

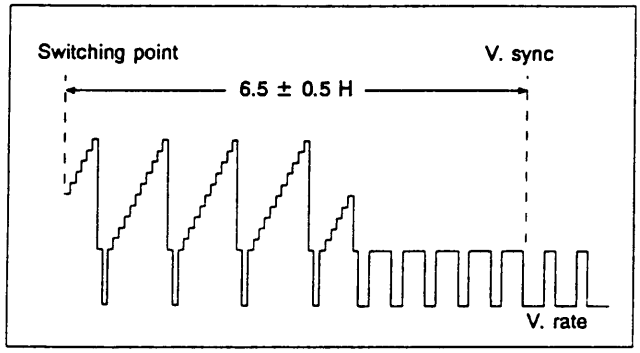


Fig. 3-1-6 PB switching point

2. Slow tracking preset

Signal	•Colour bar
Mode	•SP •REC → PB (SLOW) •Digital tracking OFF
Equipment	•TV-Monitor
Adjustment tool	•Presetting unit [PTU94008]
Specification	•Mimimum noise

Note: • *Set VCR to the mode A by remote controller.*
• *Use only buttons "B" and "C". Depressing other buttons during adjustment may cause adjustment errors.*

1) Record a colour bar signal in the SP mode.
2) Playback recorded signal on the FWD slow mode.
3) Set the tracking control to the centre position by simultaneously pressing the (+) and (-) buttons.
4) Observe the display on a TV monitor and adjust for optimum noise condition (best tracking) by depressing "C" (+) or "B" (-) buttons of the presetting unit as required.
5) Depress the STOP button.
6) Confirm that the bar noise is not visible on the monitor in the slow mode.

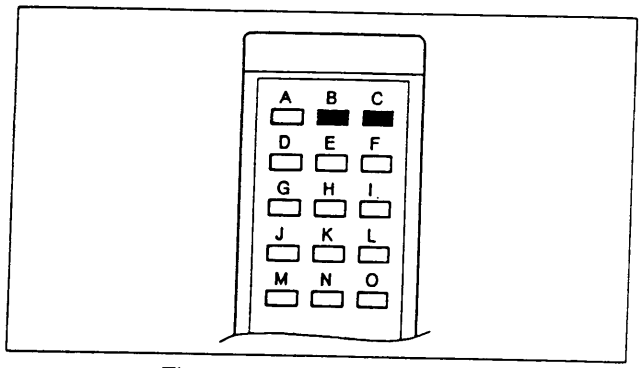


Fig. 3-1-7 Presetting unit

3.1.4 VIDEO CIRCUIT

Note: *Unless otherwise specified, all measurement points and adjustment parts are located on the VIDEO UNIT BOARD.*

Important:

Item 1. thru 6..

1) Ordinarily performing these adjustments is not required. Adjustments should be performed only if IC2 on the VIDEO UNIT BOARD has been replaced.
2) To adjust, replace fixed resistor with variable chip resistor, then adjust as required.

1. EE Y level

Signal	•Colour bar
Mode	•EE
Equipment	•Oscilloscope
Measurement point	•JA701 pin 19 (VIDEO OUT) (TERMINAL BOARD)
Adjustment part	•R42 (EE Y LEVEL)
Specification	•2.00 ± 0.06 Vp-p (Unterminated)

1) Connect an oscilloscope to JA701 pin 19.
2) Confirm that Y level is 2.00 ± 0.06 Vp-p. Unterminated.
3) If necessary, replace R42 with the variable chip resistor NVP1301-153N and adjust it for 2.00 ± 0.06 Vp-p, as in Fig. 3-1-8.

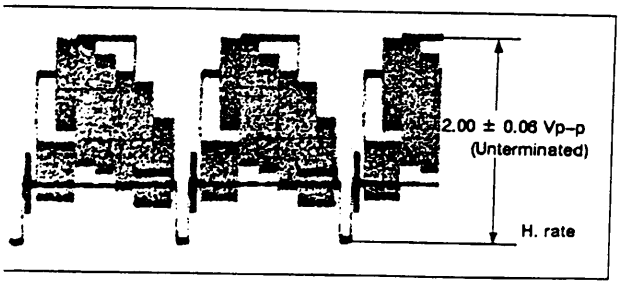


Fig. 3-1-8 EE Y level

2. White clip

Signal	•Colour bar
Mode	•EE
Equipment	•Oscilloscope
Measurement point	•IC2 pin 22
Adjustment part	•R45 (W/D CLIP)
Specification	•WHITE CLIP : 190 ± 4 % •DARK CLIP : 145 ± 8 %

1) Connect an oscilloscope to IC2 pin 22.
2) Confirm that white clip is 190 ± 4 % and dark clip is 145 ± 8 %.
3) If necessary, replace R45 with the variable chip resistor NVP1301-103N and adjust it 190 ± 4 % white clip and 145 ± 8 % dark clip, as in Fig. 3-1-9.

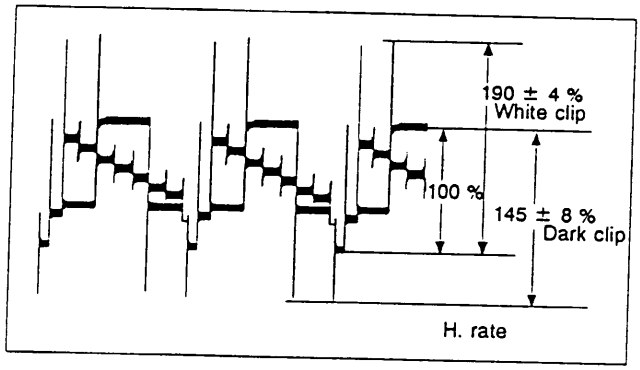


Fig. 3-1-9 White clip

3. Carrier & deviation

• Carrier

Signal	•No signal-VIDEO INPUT (Shorted RCA Phono Plug)
Mode	•EE
Equipment	•Frequency counter
Measurement point	•CN2 pin 5 (REC FM)
Adjustment part	•R28 (CARRIER)
Specification	•3.80 ± 0.04 MHz

1) Connect the frequency counter to CN2 pin 5.
2) Confirm that frequency is 3.80 ± 0.04 MHz.
3) If necessary, replace R28 with the variable chip resistor NVP1301-223N and adjust it for 3.80 ± 0.04 MHz.

• **Deviation**

Signal	•Colour bar
Mode	•REC then PB
Equipment	•Oscilloscope
Measurement point	•JA701 pin 19 (VIDEO OUT) (TERMINAL BOARD)
Adjustment part	•R29 (DEVIATION)
Specification	•2.00 ± 0.06 Vp-p (Unterminated)

4) Record and playback a colour bar signal.
5) Confirm that Y level is 2.00 ± 0.06 Vp-p unterminated.
6) If necessary, replace R29 with the variable chip resistor NVP1301-103N and adjust it for 2.00 ± 0.06 Vp-p, as in Fig. 3-1-10.

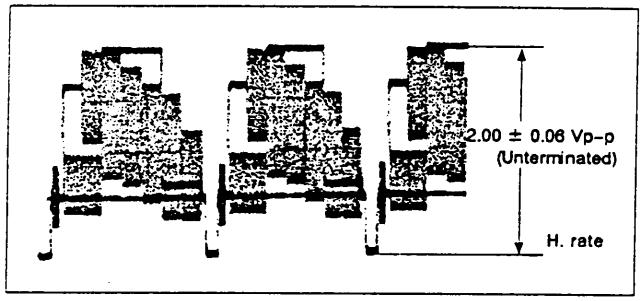


Fig. 3-1-10 Carrier & deviation

4. YNR level

Signal	•Colour bar
Mode	•EE
Equipment	•Oscilloscope
Measurement point	•IC2 pin 9
Adjustment part	•R18 (N.C. BALANCE)
Specification	•Mimimum DC step difference

1) Connect an oscilloscope to IC2 pin 9.
2) Confirm that DC step difference is minimum.
3) If necessary, replace R18 with the variable chip resistor NVP1301-152N and adjust it for minimum DC step difference, as in Fig. 3-1-11.

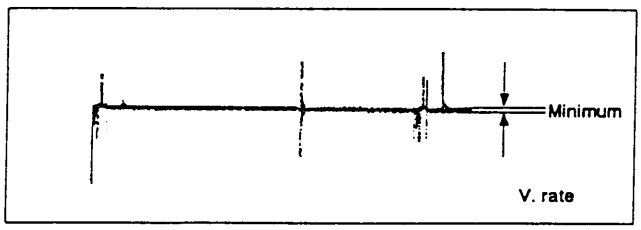


Fig. 3-1-11 YNR level

5. PB Y level

Signal	•Colour bar
Mode	•SP •REC then PB
Equipment	•Oscilloscope
Measurement point	•JA701 pin 19 (VIDEO OUT) (TERMINAL BOARD)
Adjustment part	•R25 (PB Y LEVEL)
Specification	•2.00 ± 0.06 Vp-p (Unterminated)

Note: *Confirm that procedure 3.1.4-2. is correct before performing this adjustment procedure.*

1) Connect an oscilloscope to JA701 pin 19.
2) Record and playbck a colour bar signal.
3) Confirm that Y level is 2.00 ± 0.06 Vp-p unterminated.
4) If necessary, replace R25 with the variable chip resistor NVP1301-472N and adjust it for 2.00 ± 0.06 Vp-p, as in Fig. 3-1-12.

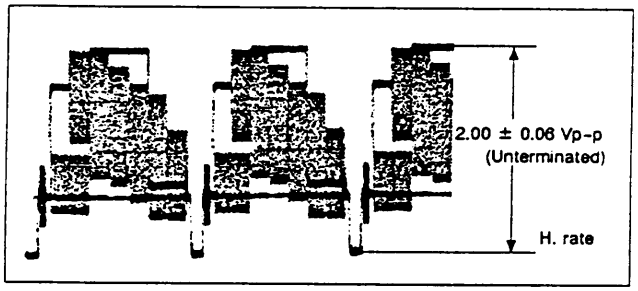


Fig. 3-1-12 PB Y level

6. REC colour level

Signal	•Colour bar
Mode	•SP •REC
Equipment	•Oscilloscope
Measurement point	•CN2 pin 11 (REC COLOUR)
Adjustment part	•R52 (REC COLOUR LEVEL)
Specification	•200 ± 10 mVp-p

1) Connect an oscilloscope to CN2 pin 11.
2) Record the colour bar signal in SP mode.
3) Confirm that colour level is 200 ± 10 mV p-p, as in Fig. 3-1-13.
4) If necessary, replace R52 with the variable chip resistor NVP1301-222N and adjust it for 200 ± 10 mVp-p.

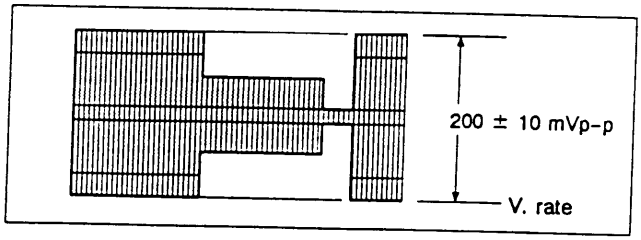


Fig. 3-1-13 REC colour level

3.1.5 TIMER CIRCUIT

Note: *Unless otherwise specified, all measurement points and adjustment parts are located on the MAIN BOARD.*

1. Timer clock

Signal	•No signal
Mode	•EE •AUX
Equipment	•Frequency counter
Measurement point	•IC601 pin 64
Adjustment part	•C614 (TIMER CLOCK)
Specification	•1024.008 ± 0.001 Hz (976.5549 ± 0.0010 μsec)

1) Connect the frequency counter to IC601 pin 64 and GND.
2) Connect the short wire between IC601 pin 33 and IC601 pin 63.
3) Short the leads of capacitor C616 once in order to reset IC601.
4) Disconnect the short wire then connect it quickly again.
5) Adjust C614 for 1024.008 ± 0.001 Hz (976.5549 ± 0.0010 μsec).
6) Disconnect the short wire.

3.1.6 TUNER CIRCUIT

Note: *Unless otherwise specified, all measurement points and adjustment parts are located on the IF UNIT BOARD.*

1. RF AGC

Note: *Before the following adjustment,*

1) Connect a cable to ANT IN and terminate TV OUT with 75 ohms.

2) Set a TV channel signal generator as follows.

Video: 65 dBμ 75 Ω, colour bar 87.5 % modulation.

Audio: 55 dBμ 75 Ω, 1 kHz ± 50 kHz deviation.

〈**Factory Method**〉

Signal	•TV broadcasting
Mode	•Tuner
Equipment	•Oscilloscope •TV signal generator
Measurement point	•IF UNIT
Adjustment part	•IF VR
Specification	•-8.0 dB from maximum level (with minimum noise)

1) Connect an oscilloscope to IF terminal of U/V tuner (front end).
2) Adjust IF VR for maximum level, then adjust IF VR to reduce the IF level -8.0 dB from maximum level.

〈Alternate Method〉

Note: *Adjust IF VR (RF AGC) to correct for excess noise in the picture or when streaks cross interference occurs due to strong electrical fields.*

1) Adjust IF VR to minimize noise or streaks on the TV screen.
2) Adjust for noisy picture with strong signal. Then adjust until noise just disappears. Select other channels to confirm proper pick-up of channels.

SECTION 4
CHARTS AND DIAGRAMS

SCHEMATIC DIAGRAM NOTES

Safety precautions

The Components identified by the symbol ⚠ are critical for safety. For continued safety, replace safety critical components only with manufactures recommended parts.

1. Schematic diagram values

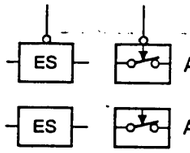
Unless otherwise specified.

1) All resistance values are in ohms. 1/6 W, 1/8 W (refer to parts list).
   Chip resistors are 1/16 W.
   K: KΩ (1000Ω), M: MΩ (1000KΩ)
2) All capacitance values are in µF, (P: PF).
3) All inductance values in µH, (m: mH).
4) All diodes are 1SS133 or MA165, (refer to parts list).

2. Indications

AUX : Active only at high.

$\overline{AUX}$: Active only at low.

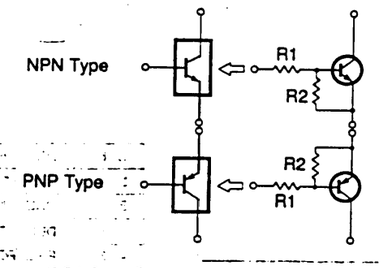


Active only at low for electronic switch.

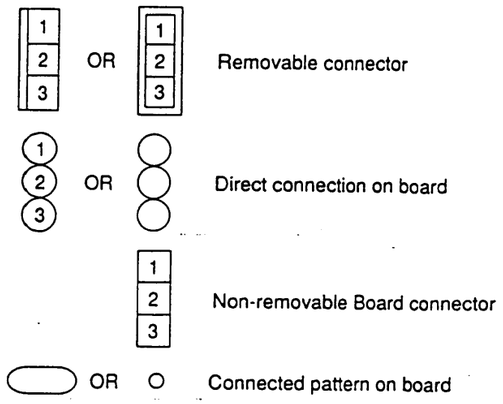
Active only at high for electronic switch.

Digital transistor :

The digital transistor includes built in resistors.
It features small size and high reliability.

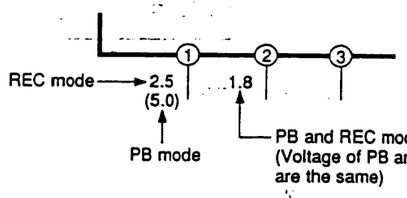


3. Interpreting Connector indications



4. Voltage measurement

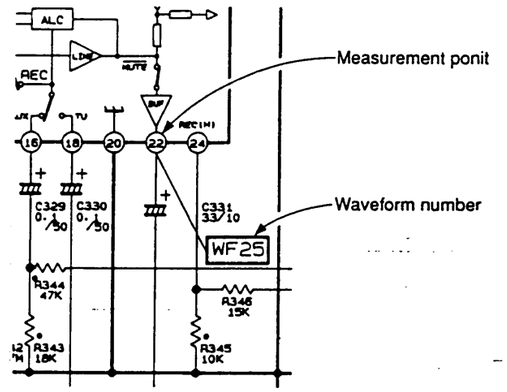
1) Video circuits
   REC: Colour bar signal in SP mode, normal VHS mode.
   PB : Alignment tape, colour bar SP mode, normal VHS mode.
   — : Unmeasurable or unnecessary to measure.
2) Audio circuits
   REC: 1KHz, –8 dBs sine wave signal in SP mode, Normal VHS mode.
   PB : REC then playback it.
3) Movie Camera circuits
   Measured using a correctly illuminated grey scale or colour bar test charts in the E-E mode.
4) Indication on schematic diagram
   Voltage Indications for REC and PB modes on the schematic diagram are as shown below.



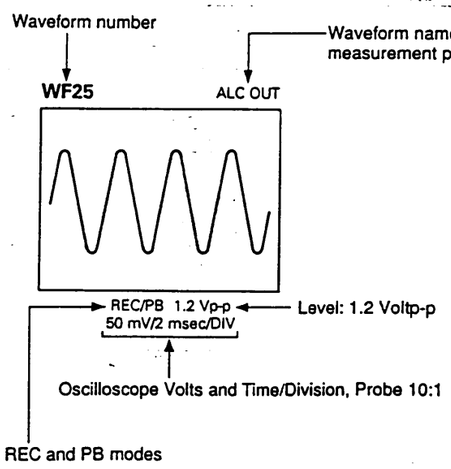
Note: If do not indicate for voltage measurement on the schematic diagram, refer to the voltage charts.

5. Waveform measurement

1) Video circuits
   REC: Colour bar signal in SP mode, normal VHS mode.
   PB : Alignment tape, colour bar SP mode, normal VHS mode.
2) Audio circuits
   REC: 1KHz, –8 dBs sine wave signal in SP mode, normal VHS mode.
   PB : REC then playback it.
3) Movie Camera circuits
   Measured using a correctly illuminated grey scale or colour bar test charts in the E-E mode.
4) Indication on schematic diagram
   Waveform indications on the schematic diagram are as shown below.



5) Waveform indications



6. Signal path Symbols

The arrows indicate the signal path as follows.

- Playback signal path
- Playback and recording signal path
- Recording signal path (including E-E signal path)
- Y signal path
- Colour (Chroma) signal path
- R or R-Y signal path
- B or B-Y signal path
- Capstan servo path
- Drum servo path
- Reel servo path

CIRCUIT BOARD NOTES

1. Colour indications

1) Foil side :
   Foil side patterns are indicated at GREY shading.
2) Component side :
   Component side patterns are indicated at RED shading.

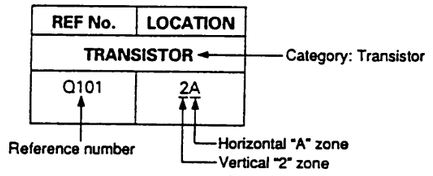
2. Foil and Component sides

1) Foil side (B side) :
   Parts on the foil side seen from foil face (pattern face) are indicated.
2) Component side (A side) :
   Parts on the component side seen from component face (parts face) are indicated.

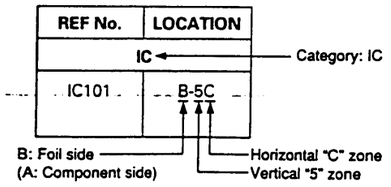
3. Parts location guides

Parts location are indicated by guide scale on the circuit board.

1) Signal pattern :



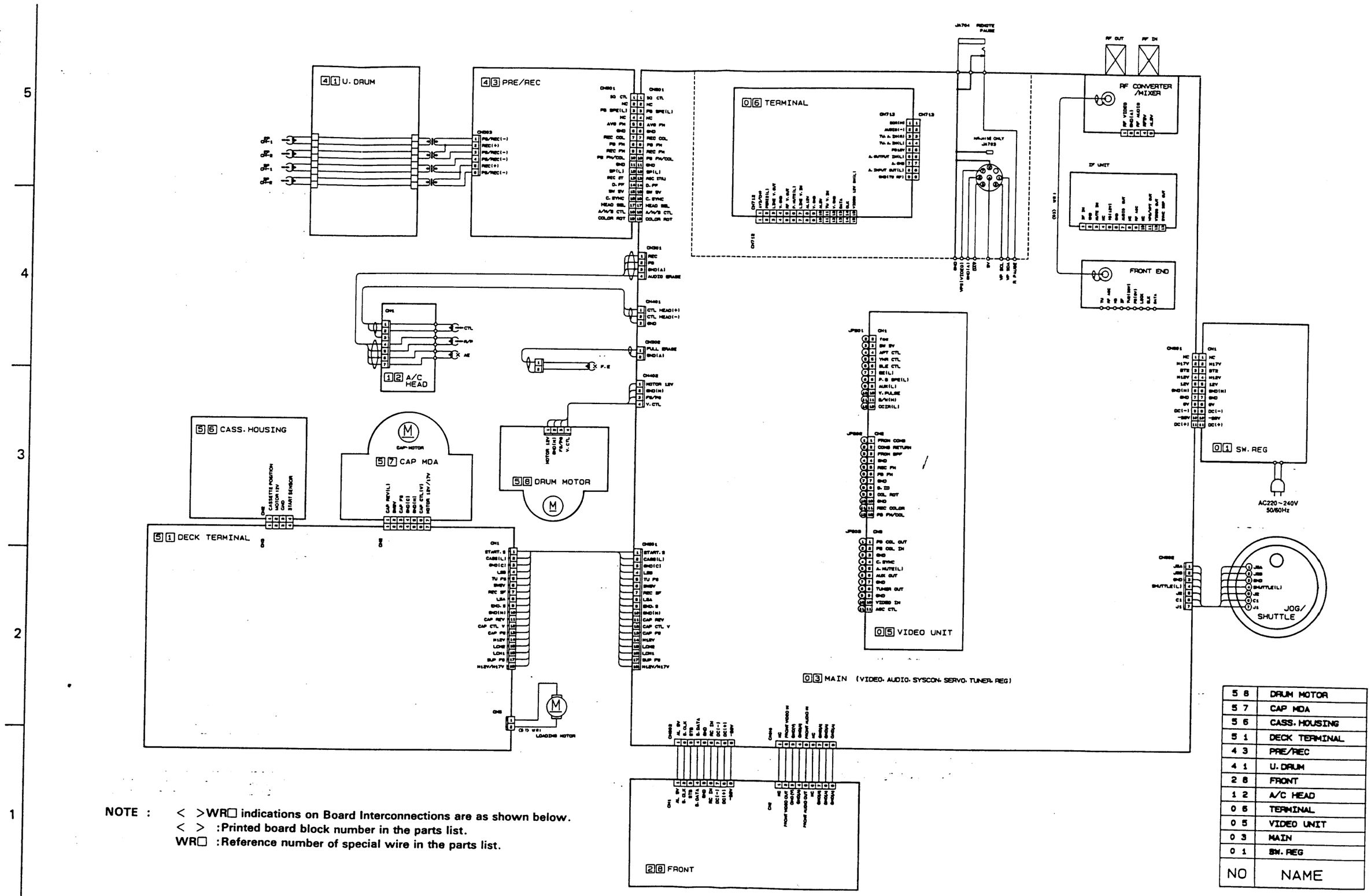
2) Double pattern :



Notes:

1) **For general information in service manual, please refer to the Service Manual of GENERAL INFORMATION Edition 4 No. 82054D (January 1994).**
2) **For repairing SMC (Surface Mounted Components), please refer to the VIDEO SERVICE GUIDE No. VTS81001.**

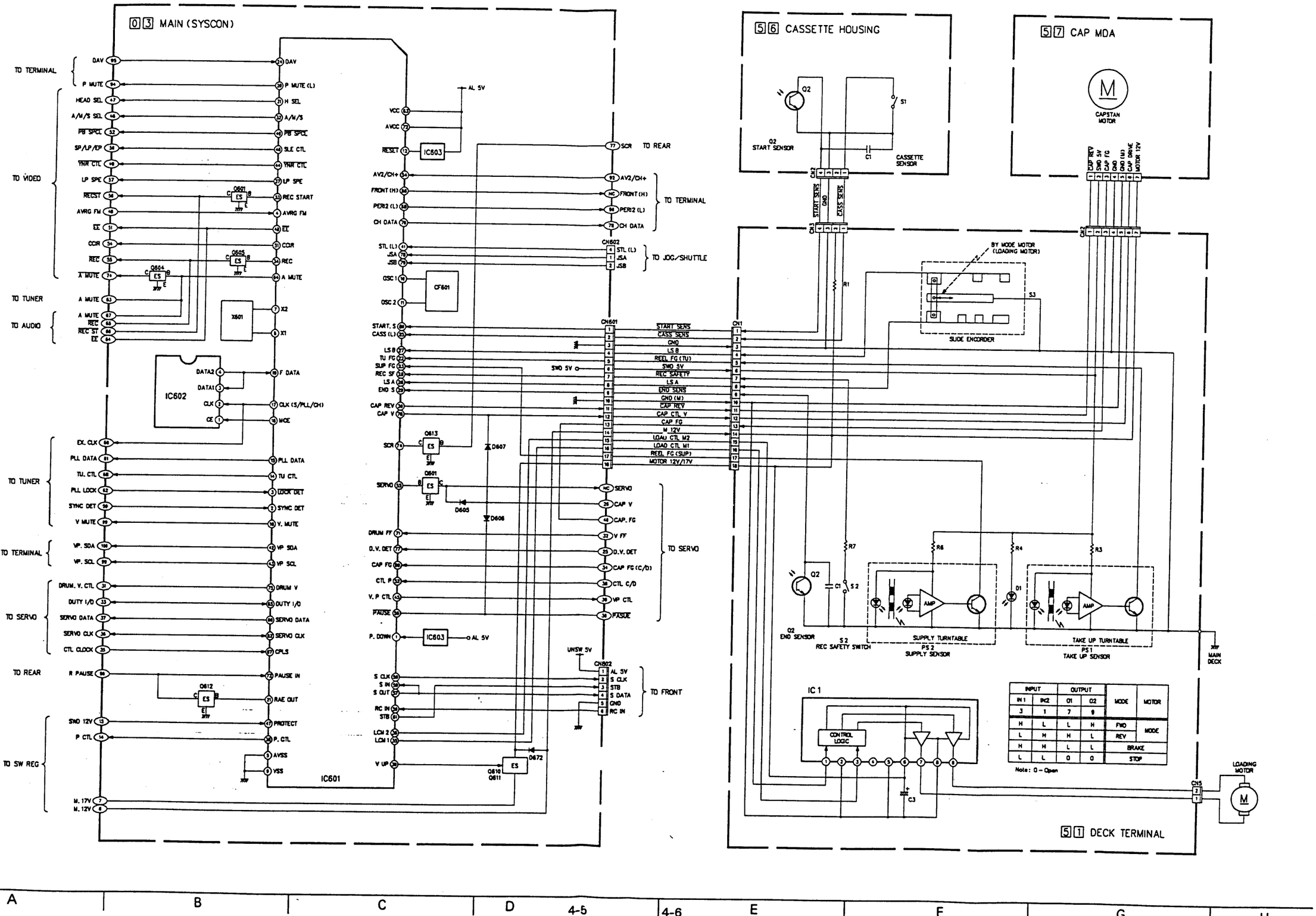
4.1 BOARD INTERCONNECTIONS



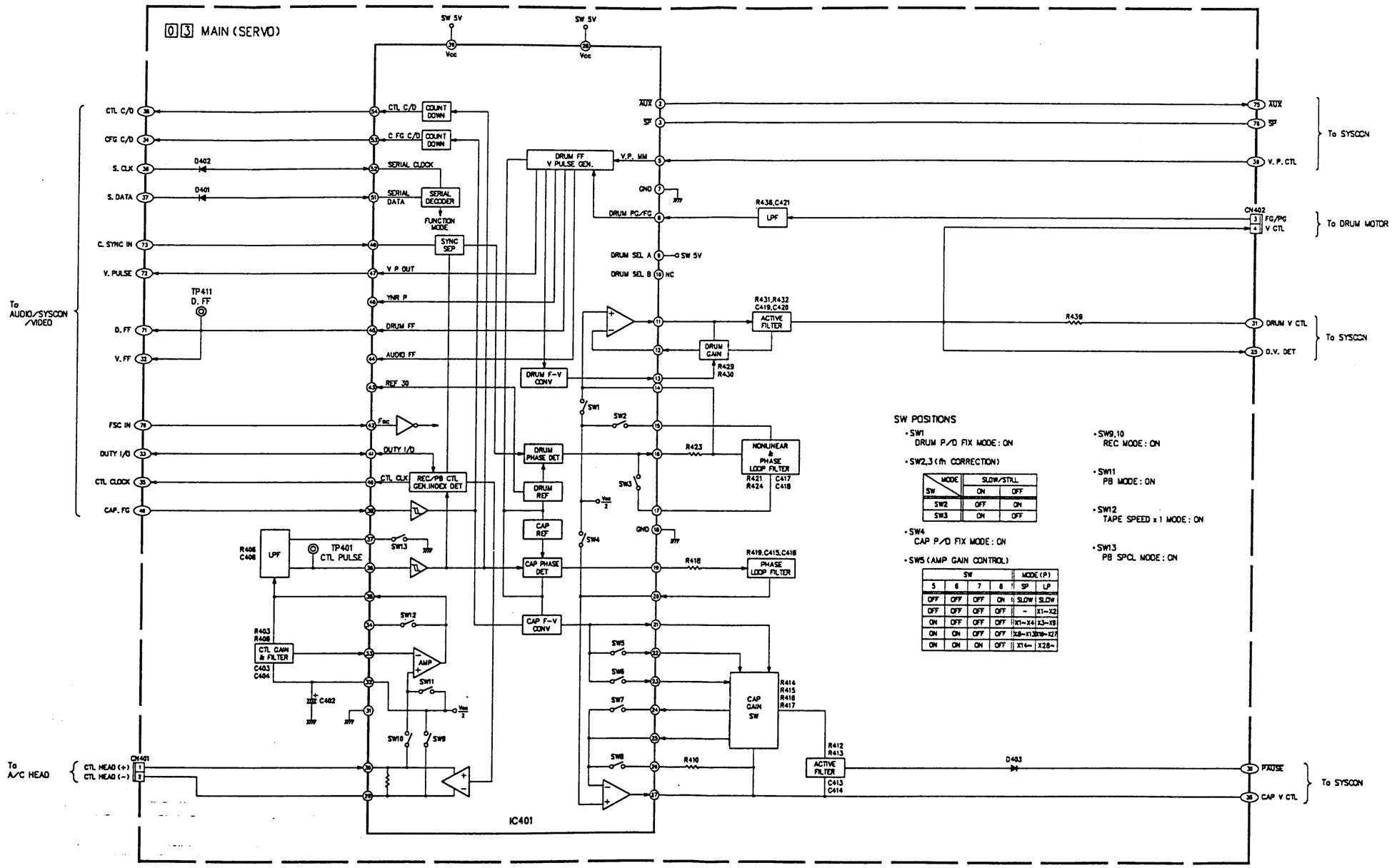
58	DRUM MOTOR
57	CAP MDA
56	CASS. HOUSING
51	DECK TERMINAL
43	PRE/REC
41	U. DRUM
28	FRONT
12	A/C HEAD
06	TERMINAL
05	VIDEO UNIT
03	MAIN
01	SW. REG
NO	NAME

NOTE : < >WR□ indications on Board Interconnections are as shown below.
< > :Printed board block number in the parts list.
WR□ :Reference number of special wire in the parts list.

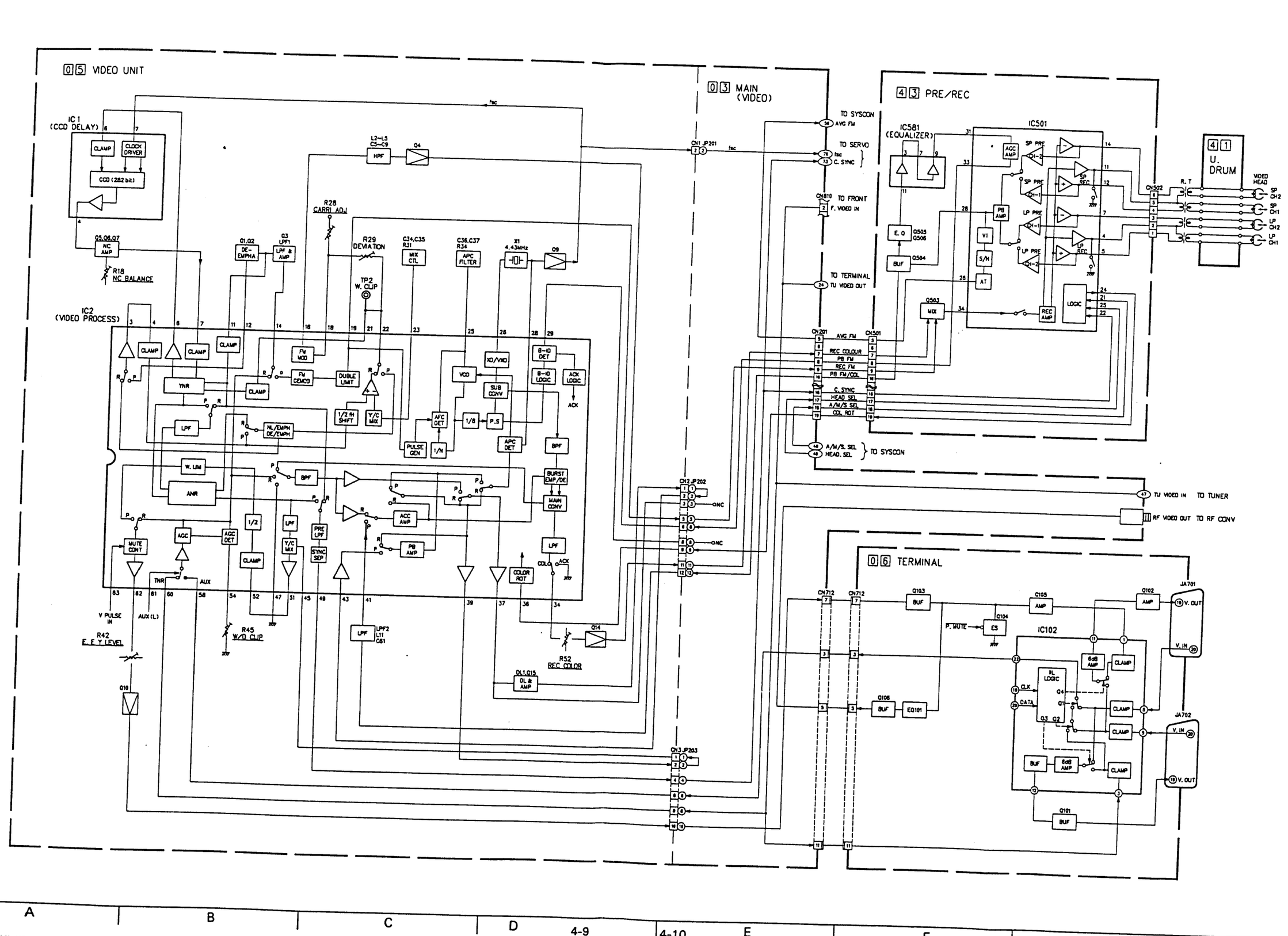
4.2 SYSCON BLOCK DIAGRAM



4.3 SERVO BLOCK DIAGRAM



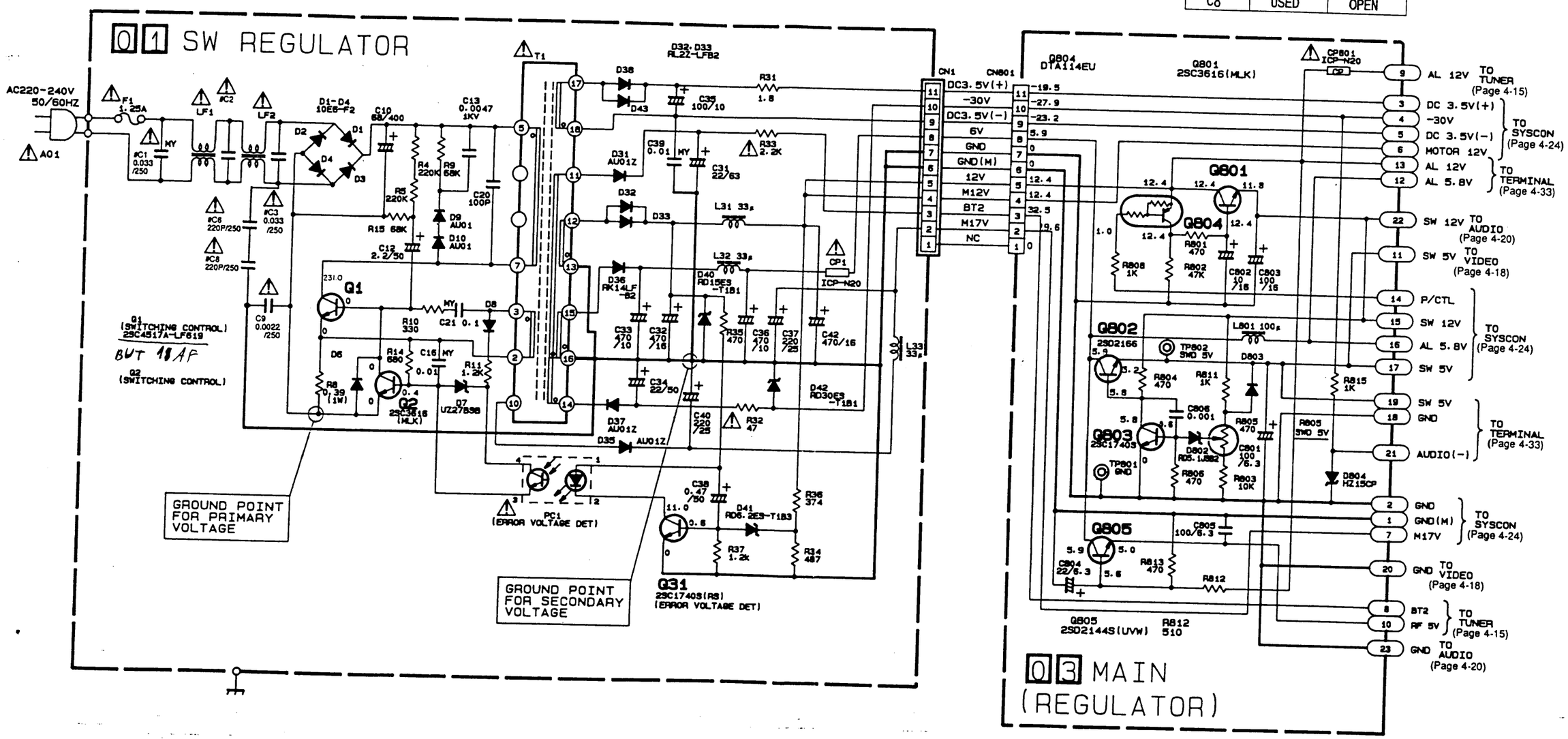
4.4 VIDEO BLOCK DIAGRAM



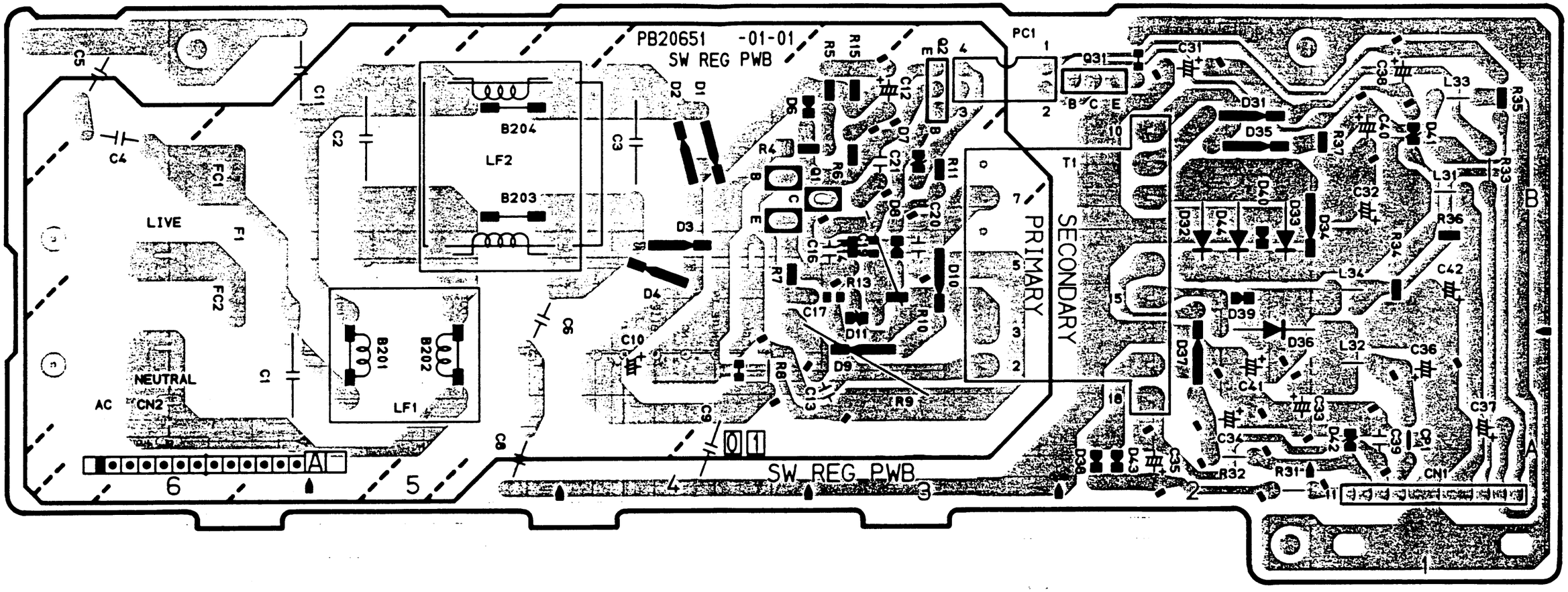
4.5 SWITCHING REGULATOR AND REGULATOR SCHEMATIC DIAGRAMS

COMPARISON CHART OF MODELS & MARKS(#)

REF. NO.	MODELS	
	HR-J415E	HR-J415EG
C1	OPEN	USED
C2	0.068/250	0.033/250
C3	USED	OPEN
C6	USED	OPEN
C8	USED	OPEN



4.6 SWITCHING REGULATOR CIRCUIT BOARD



MAIN COMPONENT PARTS LOCATION GUIDE

<SW REG PWB>

REF. No.	LOCATION
TRANSISTOR	
Q1	3B
Q2	3B
Q31	2B

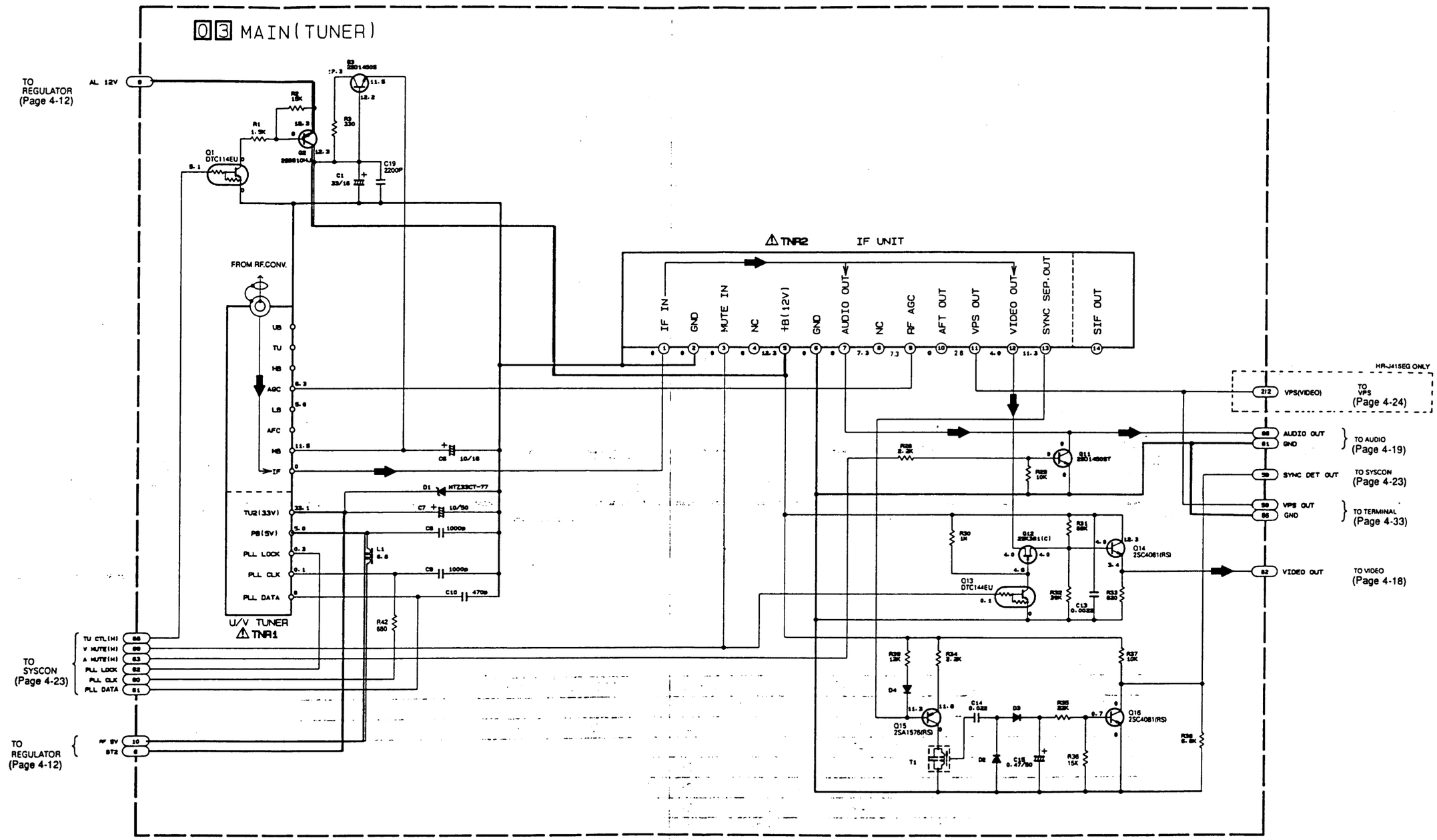
REF. No.	LOCATION
DIODE	
D1	4B
D2	4B
D3	4B
D4	4B
D6	4B
D7	3B
D8	3B
D9	3A
D10	3B
D31	2B

REF. No.	LOCATION
DIODE	
D32	2B
D33	2B
D35	2B
D36	2B
D37	2A
D38	2A
D40	2B
D41	1B
D42	1A
D43	2A

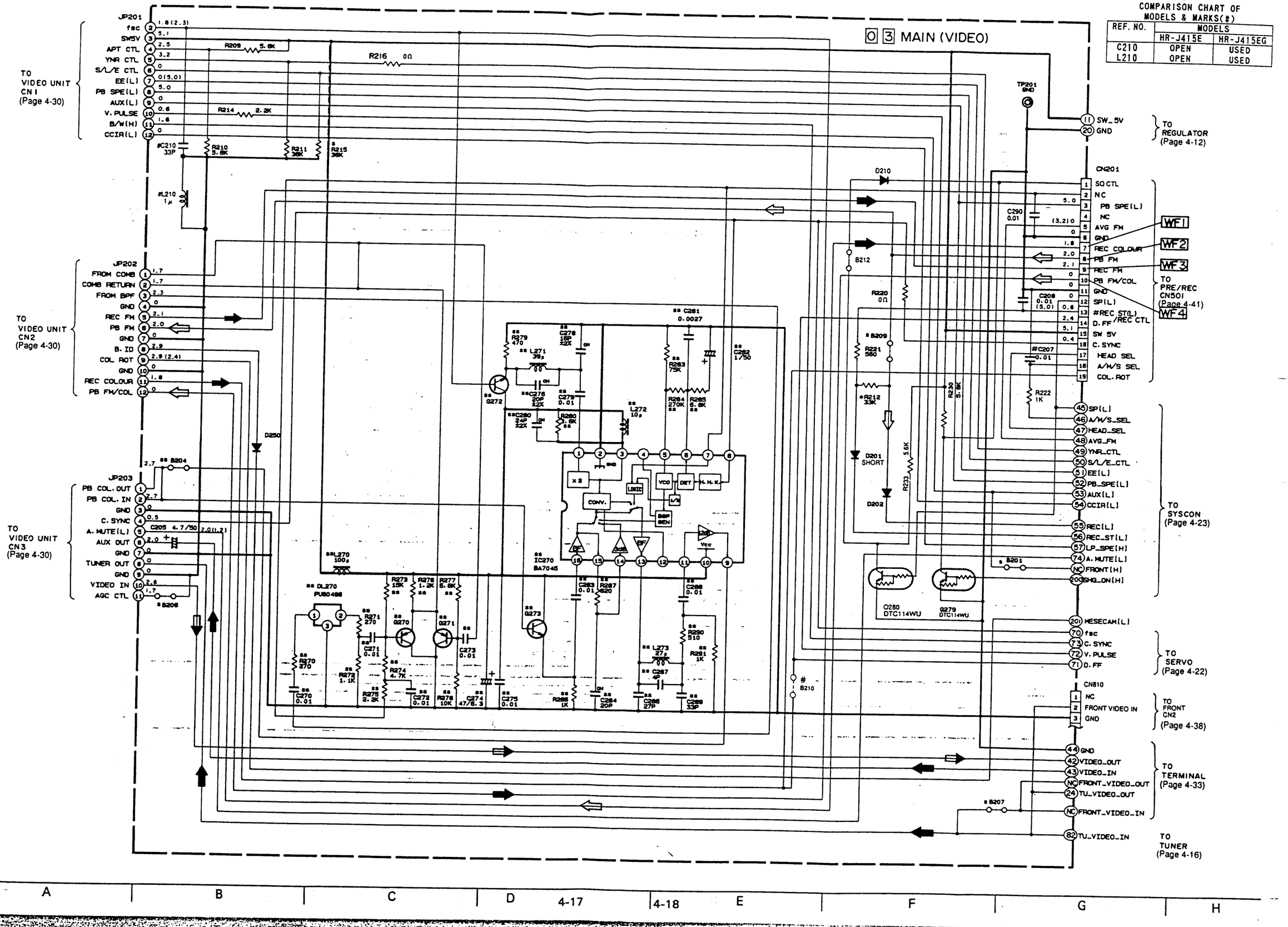
REF. No.	LOCATION
CONNECTOR	
CN1	1A

REF. No.	LOCATION
CP	
CP1	1A

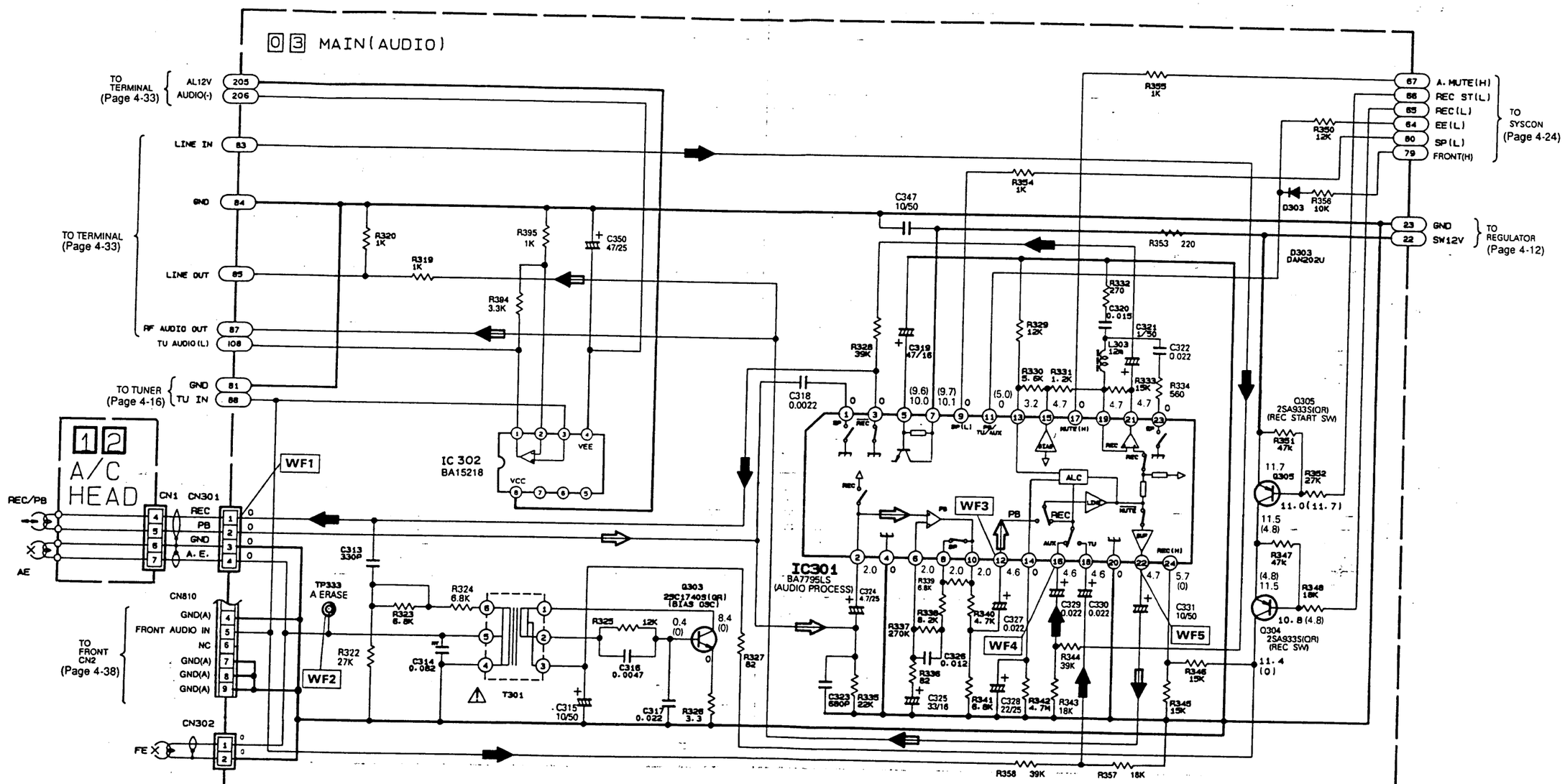
4.7 TUNER SCHEMATIC DIAGRAM



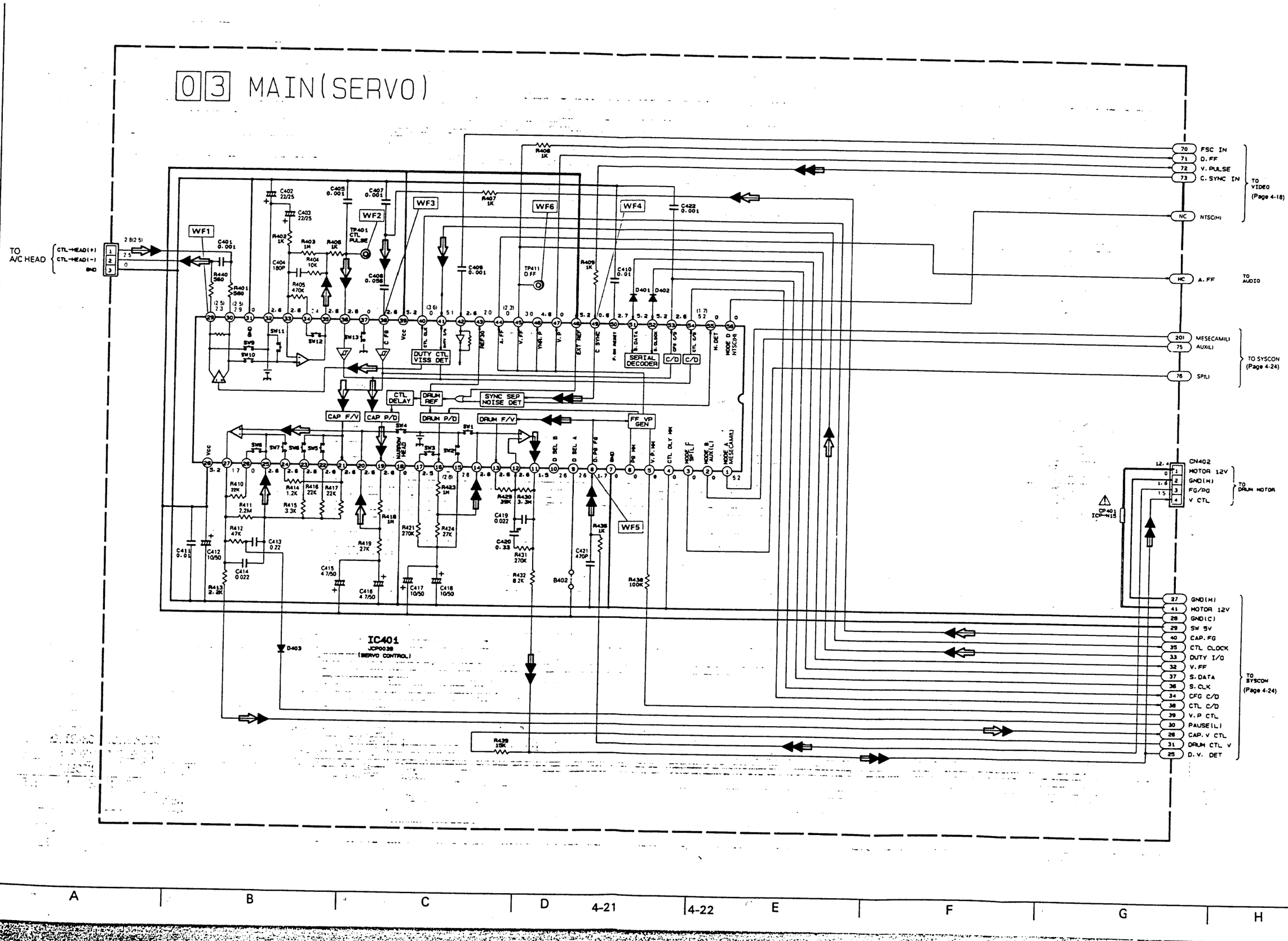
4.8 VIDEO SCHEMATIC DIAGRAM



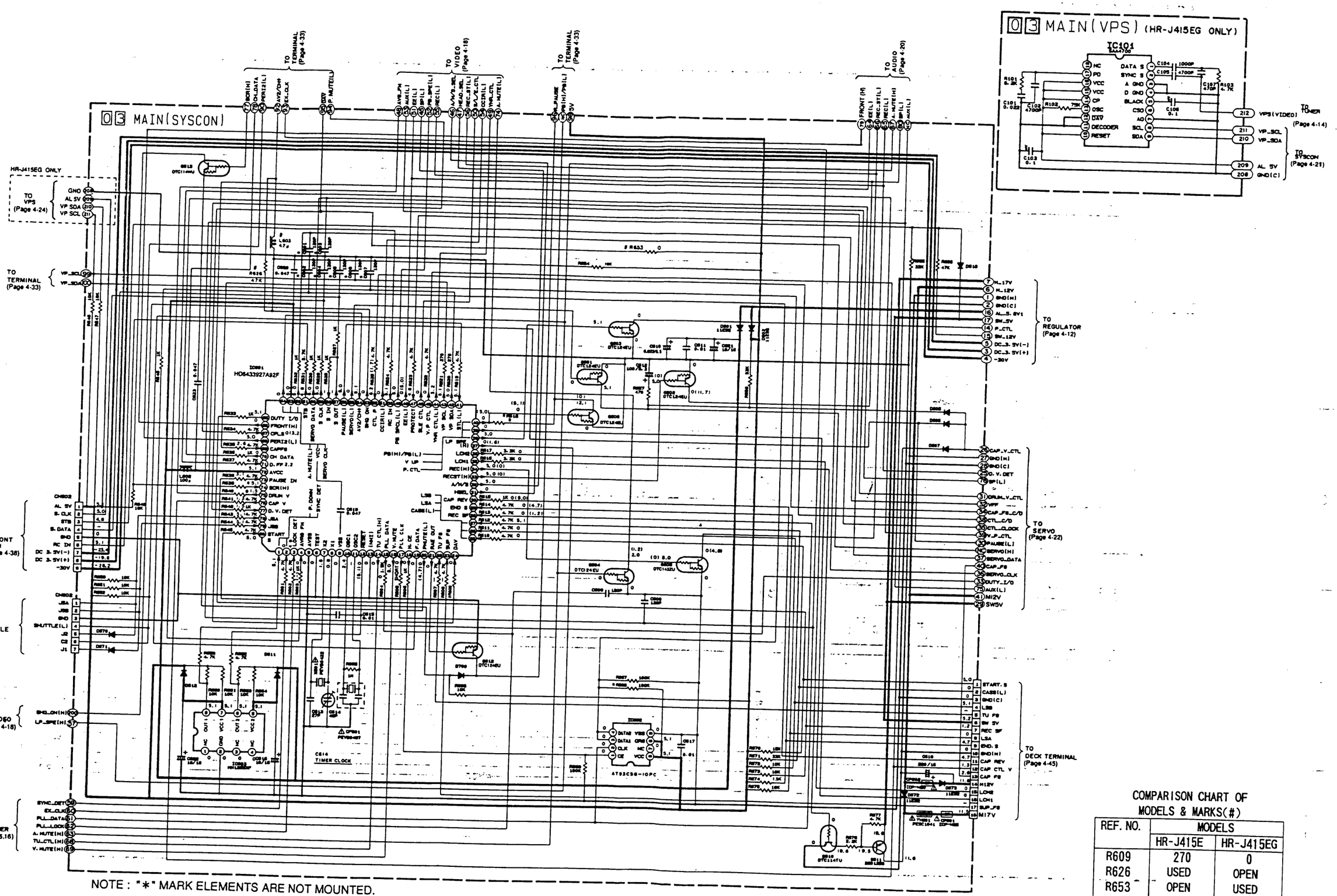
4.9 AUDIO SCHEMATIC DIAGRAM



4.10 SERVO SCHEMATIC DIAGRAM



4.11 SYSCON SCHEMATIC DIAGRAM



COMPARISON CHART OF MODELS & MARKS(#)

REF. NO.	MODELS	
	HR-J415E	HR-J415EG
R609	270	0
R626	USED	OPEN
R653	OPEN	USED
L603	OPEN	USED

4.12 MAIN CIRCUIT BOARD

MAIN COMPONENT PARTS LOCATION GUIDE

<MAIN PWB>

REF. No.	LOCATION
IC	
IC301	9M
IC302	5M
IC401	6H
IC601	17E
IC602	17G
IC603	16G

REF. No.	LOCATION
TRANSISTOR	
Q1	19M
Q2	19N
Q3	17M
Q11	13N
Q12	15N
Q13	15M
Q14	15N
Q15	14N
Q16	13N
Q279	5J
Q280	5J
Q303	11N
Q304	8N
Q305	7N
Q601	16C
Q602	14J
Q603	18C
Q604	15F
Q605	15J
Q608	18C
Q610	19I
Q611	17J
Q612	17K
Q613	15G
Q701	19N
Q702	19M
Q801	21C
Q802	20D
Q803	20D
Q804	21E
Q805	21C

REF. No.	LOCATION
DIODE	
D1	17M
D2	14N

REF. No.	LOCATION
DIODE	
D3	13N
D4	14N
D201	7K
D202	6K
D210	4K
D250	4F
D303	8O
D401	10I
D402	10I
D403	15C
D601	19E
D602	19F
D605	16B
D606	16B
D607	15H
D610	19B
D611	16I
D612	15H
D670	18B
D671	18B
D672	18K
D673	18K
D701	19N
D703	20M
D802	20C
D803	20C
D804	20F

REF. No.	LOCATION
CONNECTOR	
CN201	5L
CN301	14L
CN302	14L
CN401	15K
CN402	13K
CN601	16K
CN602	21B
CN712	3O
CN713	6O
CN801	21E
CN802	21A
CN810	2A

REF. No.	LOCATION
ADJUSTMENT	
R805	20C
C614	17F

REF. No.	LOCATION
TEST POINT	
TP201	4M
TP333	12L
TP401	2D
TP411	3E
TP801	22C
TP802	20B

REF. No.	LOCATION
CP	
CP401	13K
CP601	17K
CP602	18K
CP801	21E

LEADLESS COMPONENT PARTS LOCATION GUIDE

<MAIN PWB>

REF. No.	LOCATION
IC	
IC601	17E
IC602	16G

REF. No.	LOCATION
TRANSISTOR	
Q1	19M
Q13	15M
Q14	15N
Q15	14N
Q16	13N
Q276	5K
Q277	5K
Q279	5K
Q280	5K
Q601	16C
Q602	14J
Q603	18C
Q604	15F
Q605	15J
Q608	18C
Q610	19I
Q612	17H
Q613	15G
Q804	21E

REF. No.	LOCATION
RESISTOR	
R1	19M
R2	19M
R3	17M
R28	13N
R29	13N
R30	15N
R31	15N
R32	15N
R33	15N
R34	14N
R35	13N

REF. No.	LOCATION
RESISTOR	
R36	13N
R37	15M
R38	14M
R39	14M
R101	2N
R102	3N
R103	3M
R209	2F
R210	1F
R211	1F
R212	6K
R214	2G
R215	1F
R216	10G
R220	7L
R221	6L
R222	7J
R230	5L
R231	5L
R232	5L
R233	5K
R270	3F
R271	3F
R272	3F
R273	3G
R274	3G
R275	3F
R276	3G
R278	2F
R279	3I
R283	3L
R284	3K
R285	3K
R286	2K
R287	3J
R290	3J
R291	2J
R319	8M
R320	8M
R322	13M
R323	13L
R324	12M
R325	12N
R326	11M
R329	9O
R330	9N
R331	9N
R332	9O
R333	9N
R334	8N

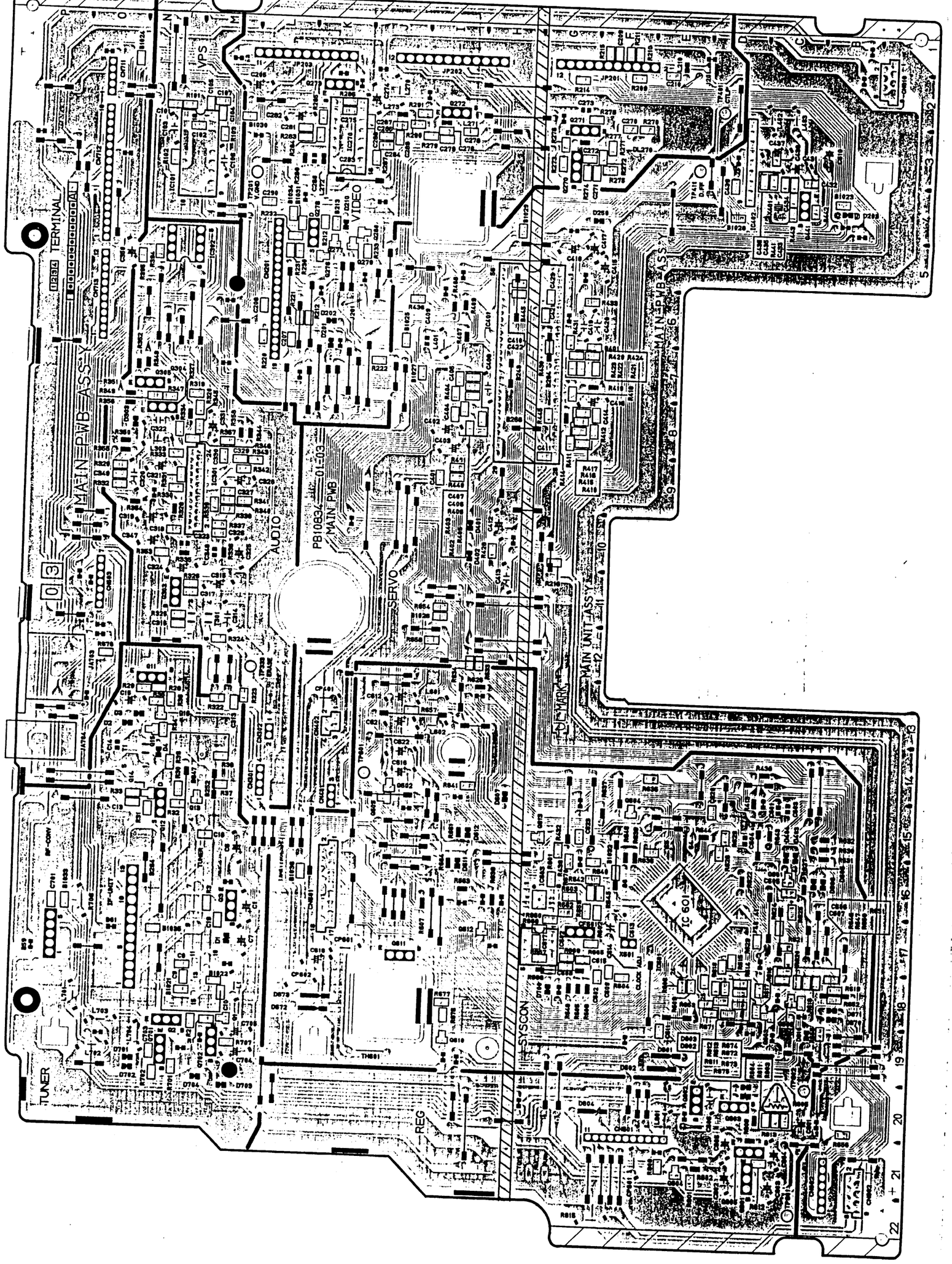
REF. No.	LOCATION
RESISTOR	
R337	10M
R338	10M
R339	10M
R340	9M
R341	9M
R342	9M
R343	9L
R345	8M
R346	8M
R347	8N
R351	8N
R353	10N
R357	8M
R394	5N
R395	5N
R401	9I
R402	8I
R403	8I
R404	7I
R405	8H
R406	8I
R410	8G
R411	8G
R412	8F
R415	8G
R416	8G
R417	8G
R418	7G
R421	7F
R422	7G
R423	7G
R424	7F
R428	10H
R429	7G
R430	7G
R431	6G
R432	15G
R433	6F
R436	6J
R439	16G
R440	9I
R441	3C
R442	4C
R443	4C
R445	8G
R601	16G
R602	17F
R603	16G

REF. No.	LOCATION
RESISTOR	
R604	18F
R608	18E
R609	18D
R610	18D
R611	18D
R612	18D
R613	18D
R614	17D
R615	17D
R616	18C
R617	18C
R618	18B
R619	18B
R620	17C
R621	17C
R623	17C
R624	17C
R625	16C
R628	15D
R629	15D
R633	12H
R634	12H
R635	14E
R636	16E
R640	16F
R641	14H
R642	16F
R645	16F
R646	18B
R647	18B
R650	18B
R651	18B
R652	18B
R653	18D
R654	11I
R655	19B
R656	20B
R657	13I
R658	12I
R659	17F
R660	17G
R662	17G
R665	17F
R666	18G
R667	17G
R668	17G
R669	17G
R670	16F

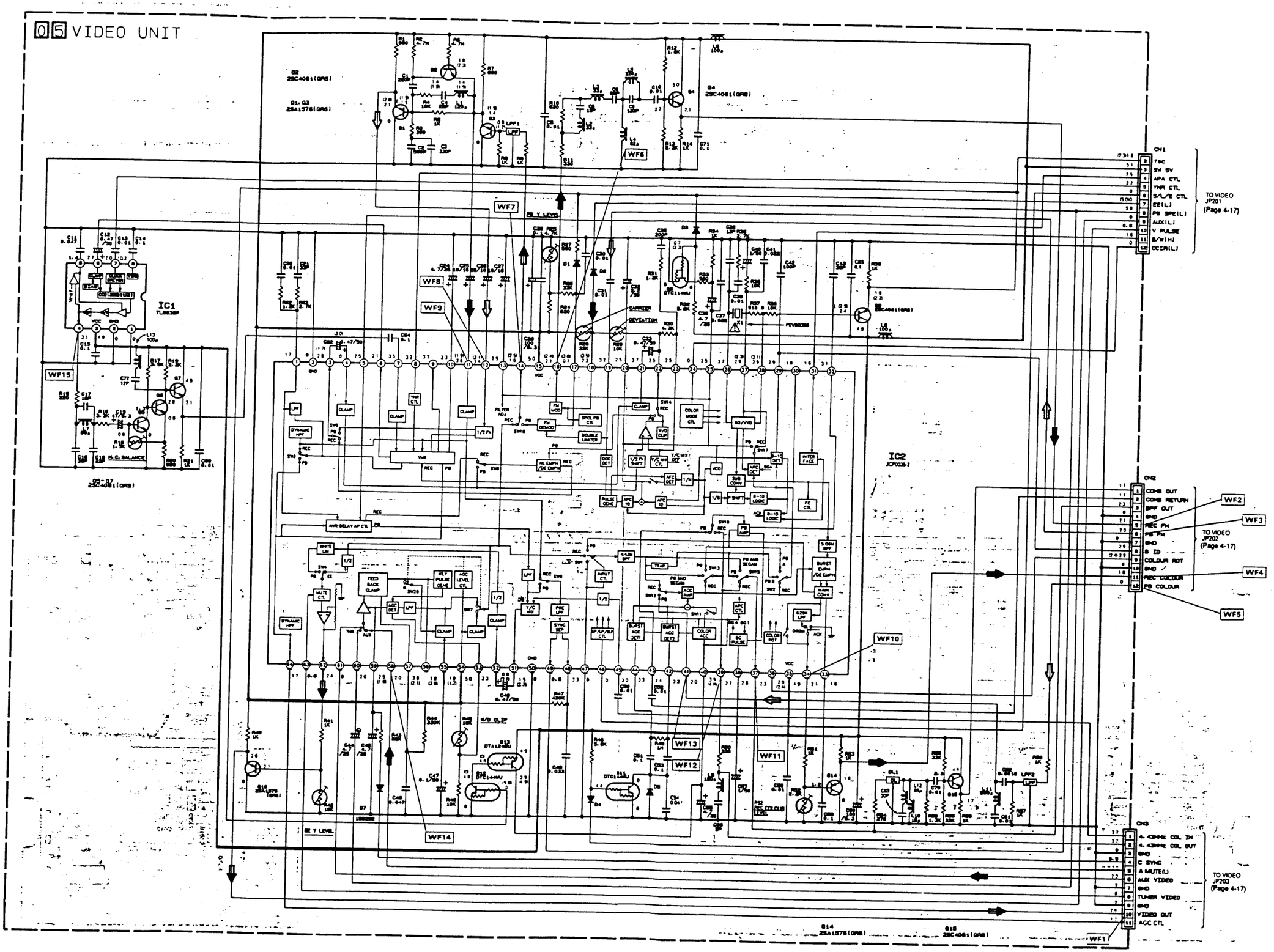
REF. No.	LOCATION
RESISTOR	
R671	18D
R672	18C
R673	18C
R674	18C
R675	18D
R676	19I
R677	18I
R678	12O
R701	20N
R702	20N
R707	19L
R801	21D
R803	20C
R804	20C
R808	21E
R811	20C
R812	21C

REF. No.	LOCATION
CAPACITOR	
C8	18M
C9	18M
C10	18M
C13	15N
C18	15M
C19	17M
C101	3N
C102	3N
C104	3M
C105	2M
C107	2M
C207	7L
C208	6L
C209	2F
C210	2E
C270	3F
C271	3G
C272	3G
C275	3K
C276	3I
C278	3I
C279	3I
C281	3L
C284	3J
C286	3J
C287	3J
C288	3J
C289	3J

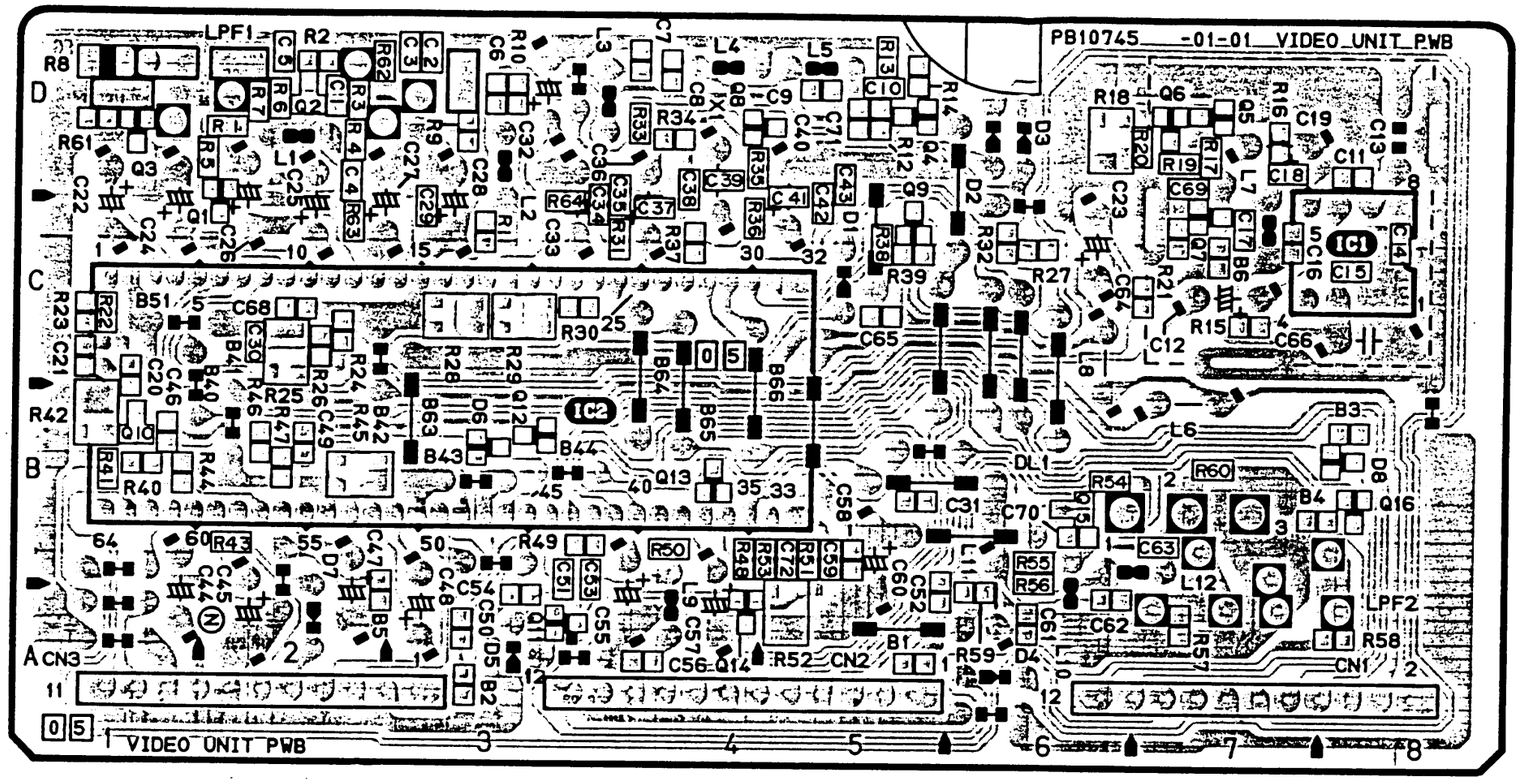
REF. No.	LOCATION
CAPACITOR	
C290	4L
C313	13M
C316	12N
C317	11M
C318	10N
C326	10M
C327	9M
C329	9M
C330	9M
C349	9O
C401	9I
C404	8I
C405	7I
C406	7I
C407	7I
C410	5H
C411	8G
C414	8F
C421	6G
C422	6H
C423	6G
C432	3C
C433	4C
C434	4C
C435	3C
C436	3D
C438	3C
C439	4D
C602	18F
C605	16C
C606	17C
C607	18C
C608	18G
C609	18F
C611	19E
C613	17F
C615	17F
C617	17G
C620	15D
C623	15F
C701	17P
C703	19N


MAIN PWB ASS'Y
TERMINAL
VPS
VIDEO
AUDIO
SERVO
SYSCON
TUNER
REG
MAIN UNIT
MAIN PWB ASS'Y
PB1083-01-03
MAIN PWB
IC109

4.13 VIDEO UNIT SCHEMATIC DIAGRAM



4.14 VIDEO UNIT CIRCUIT BOARD



MAIN COMPONENT PARTS LOCATION GUIDE

<VIDEO UNIT PWB>

REF. No.	LOCATION
IC	
IC1	8C
IC2	4B

REF. No.	LOCATION
TRANSISTOR	
Q1	2D
Q2	2D
Q3	1D
Q4	5D
Q5	7D
Q6	7D
Q7	7C
Q8	4D
Q9	5C
Q10	1B
Q11	3A
Q12	3B
Q13	4B
Q14	4A
Q15	6B

REF. No.	LOCATION
DIODE	
D1	5C
D2	6D
D3	6D
D4	6A
D5	3A
D7	2A

REF. No.	LOCATION
CONNECTOR	
CN1	8A
CN2	5A
CN3	1A

REF. No.	LOCATION
ADJUSTMENT	
R18	6D
R25	2C
R28	3C
R29	3C
R42	1B
R45	2B
R52	5A

LEADLESS COMPONENT PARTS LOCATION GUIDE

<VIDEO UNIT PWB>

REF. No.	LOCATION
TRANSISTOR	
Q1	2D
Q2	2D
Q3	1D
Q4	5D
Q5	7D
Q6	7D
Q7	7C
Q8	4D
Q9	5C
Q10	1B
Q11	3A
Q12	3B
Q13	4B
Q14	4A
Q15	6B
Q16	8B

REF. No.	LOCATION
DIODE	
D6	3B

REF. No.	LOCATION
RESISTOR	
R1	2D
R2	2D
R3	2D
R4	2D
R5	2D
R6	2D
R7	2D
R8	1D
R9	3D
R10	3D
R11	3C
R12	5D
R13	5D
R14	5D
R15	7C
R16	7D
R17	7D
R18	6D
R19	7D
R20	6D
R21	7C
R22	1C

REF. No.	LOCATION
RESISTOR	
R23	1C
R24	2C
R25	2C
R26	2C
R27	6C
R28	3C
R29	3C
R30	3C
R31	4C
R32	6C
R33	4D
R34	4D
R35	4D
R36	4C
R37	4C
R38	5C
R39	5C
R40	1B
R41	1B
R42	1B
R43	2A
R44	1B
R45	2B
R46	2B
R47	2B
R48	4B
R49	4B
R50	4B
R51	5B
R52	5A
R53	5B
R54	6B
R55	6B
R56	6B
R57	7A
R58	8A
R59	6A
R60	7B
R61	1D
R62	2C
R63	3D
R64	3C

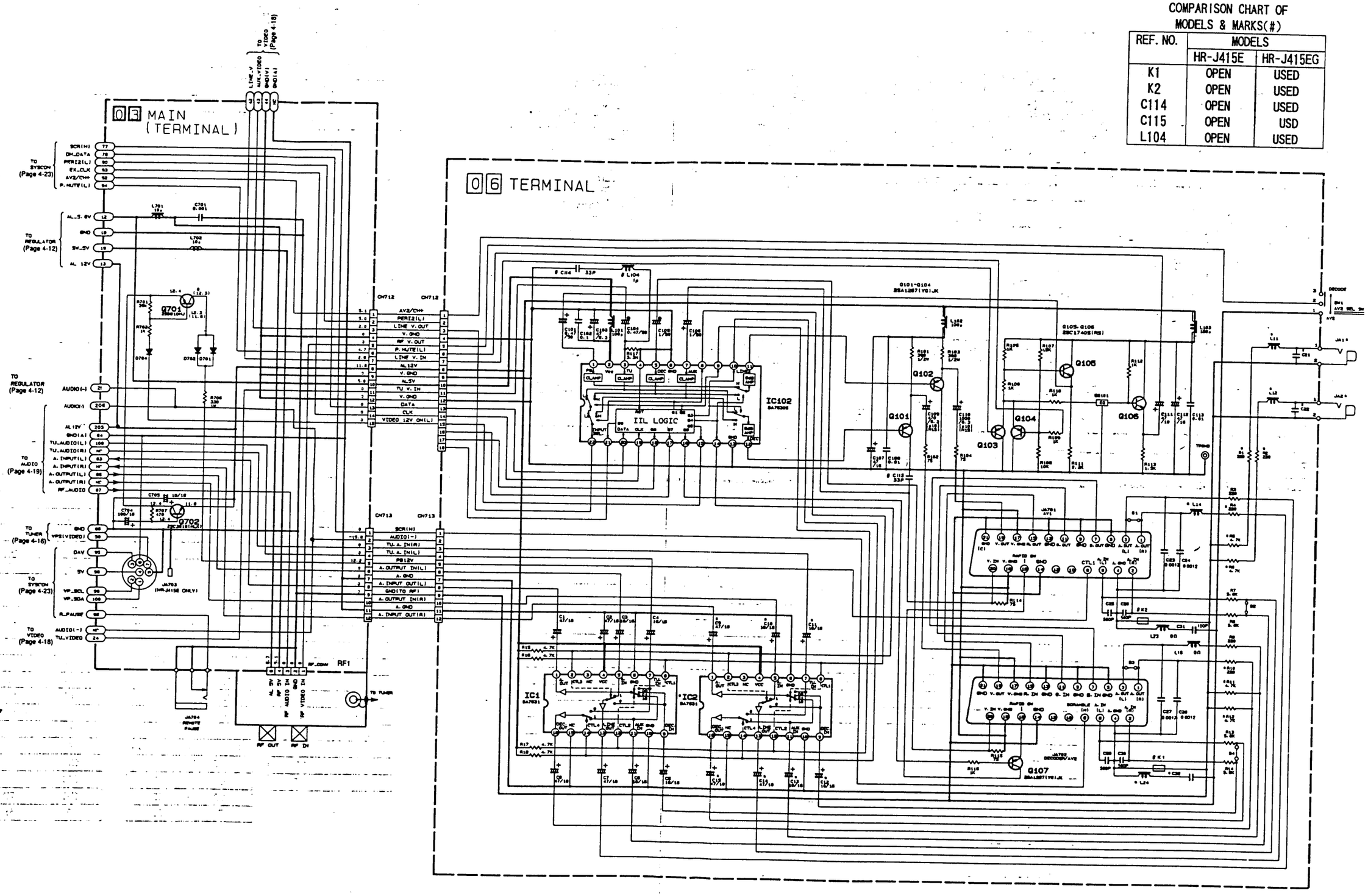
REF. No.	LOCATION
CAPACITOR	
C1	2D
C2	2D
C3	3D

REF. No.	LOCATION
CAPACITOR	
C4	2D
C5	2D
C6	3D
C7	4D
C8	4D
C9	5D
C10	5D
C11	8D
C14	8C
C15	8C
C16	7C
C17	7C
C18	7D
C20	1C
C21	1C
C29	3C
C30	2C
C31	5B
C34	4D
C35	4D
C37	4C
C38	4D
C39	4D
C41	5D
C42	5D
C43	5D
C46	1B
C49	2B
C50	3A
C51	3B
C52	5A
C53	4B
C54	3A
C56	4A
C58	5B
C59	5B
C61	6A
C62	6A
C63	7B
C64	7C
C65	5C
C67	8C
C68	2C
C69	7D
C70	6B
C71	5D
C72	7D
C73	5B

4.15 TERMINAL & MAIN (TERMINAL) SCHEMATIC DIAGRAMS

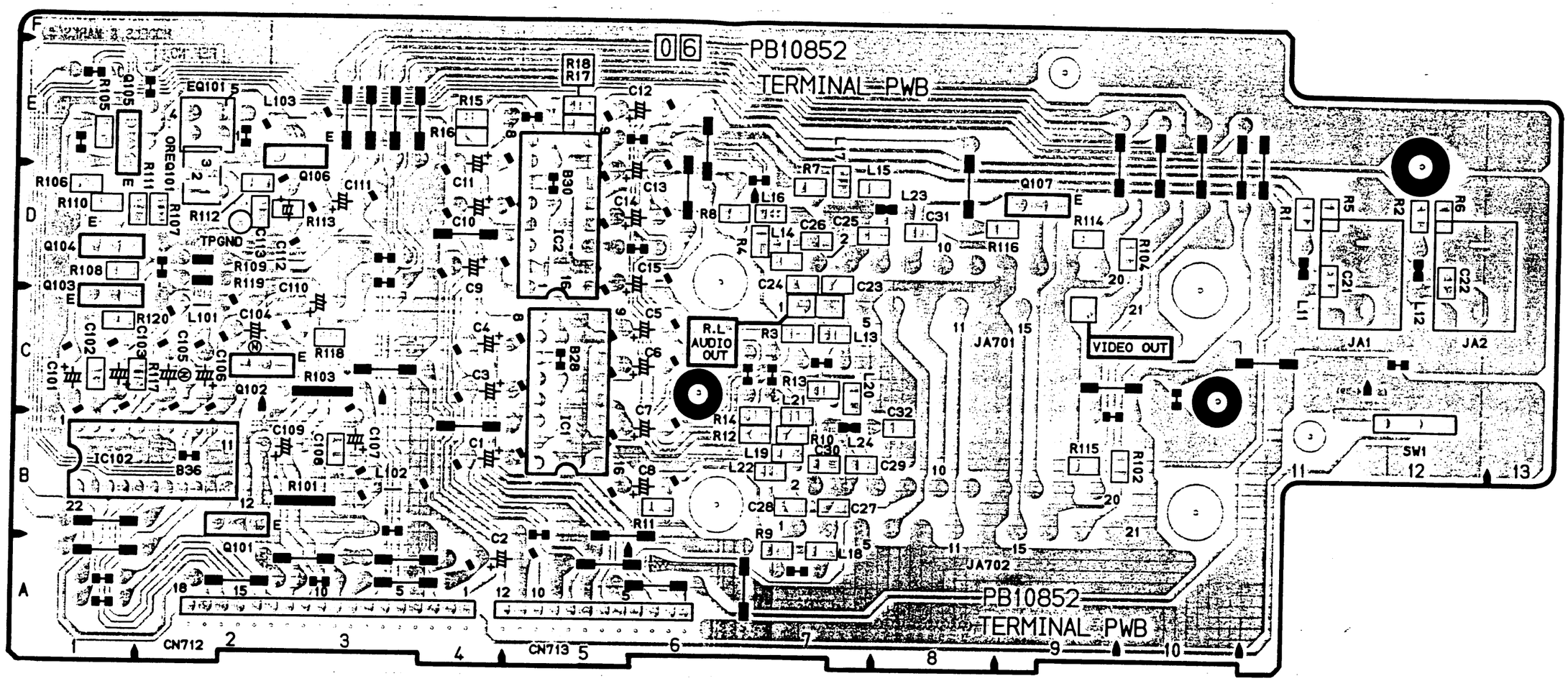
COMPARISON CHART OF MODELS & MARKS(#)

REF. NO.	MODELS	
	HR-J415E	HR-J415EG
K1	OPEN	USED
K2	OPEN	USED
C114	OPEN	USED
C115	OPEN	USD
L104	OPEN	USED



NOTE : "*" MARK ELEMENTS ARE NOT MOUNTED.

4.16 TERMINAL CIRCUIT BOARD



MAIN COMPONENT PARTS LOCATION GUIDE

<TERMINAL PWB>

REF. No.	LOCATION
IC	
IC1	5B
IC102	1B

REF. No.	LOCATION
CONNECTOR	
CN712	2A
CN713	5A

REF. No.	LOCATION
TRANSISTOR	
Q101	2B
Q102	2C
Q103	1C
Q104	1D
Q105	1E
Q106	3E
Q107	9D

LEADLESS COMPONENT PARTS LOCATION GUIDE

<TERMINAL PWB>

REF. No.	LOCATION
RESISTOR	
R1	11D
R2	12D
R3	7C
R4	6D
R5	11D
R6	12D
R7	7D
R8	6D
R9	7A
R10	7B
R11	6B
R12	6B
R13	7C
R14	6B
R15	4E

REF. No.	LOCATION
RESISTOR	
R16	4E
R17	5E
R18	5E
R102	10B
R104	10D
R105	1E
R106	1D
R107	2D
R108	1D
R110	1D
R111	2D
R112	2D
R113	3D
R114	9D
R115	9B

REF. No.	LOCATION
RESISTOR	
R116	8D
R117	2C
R118	3C
R120	1C

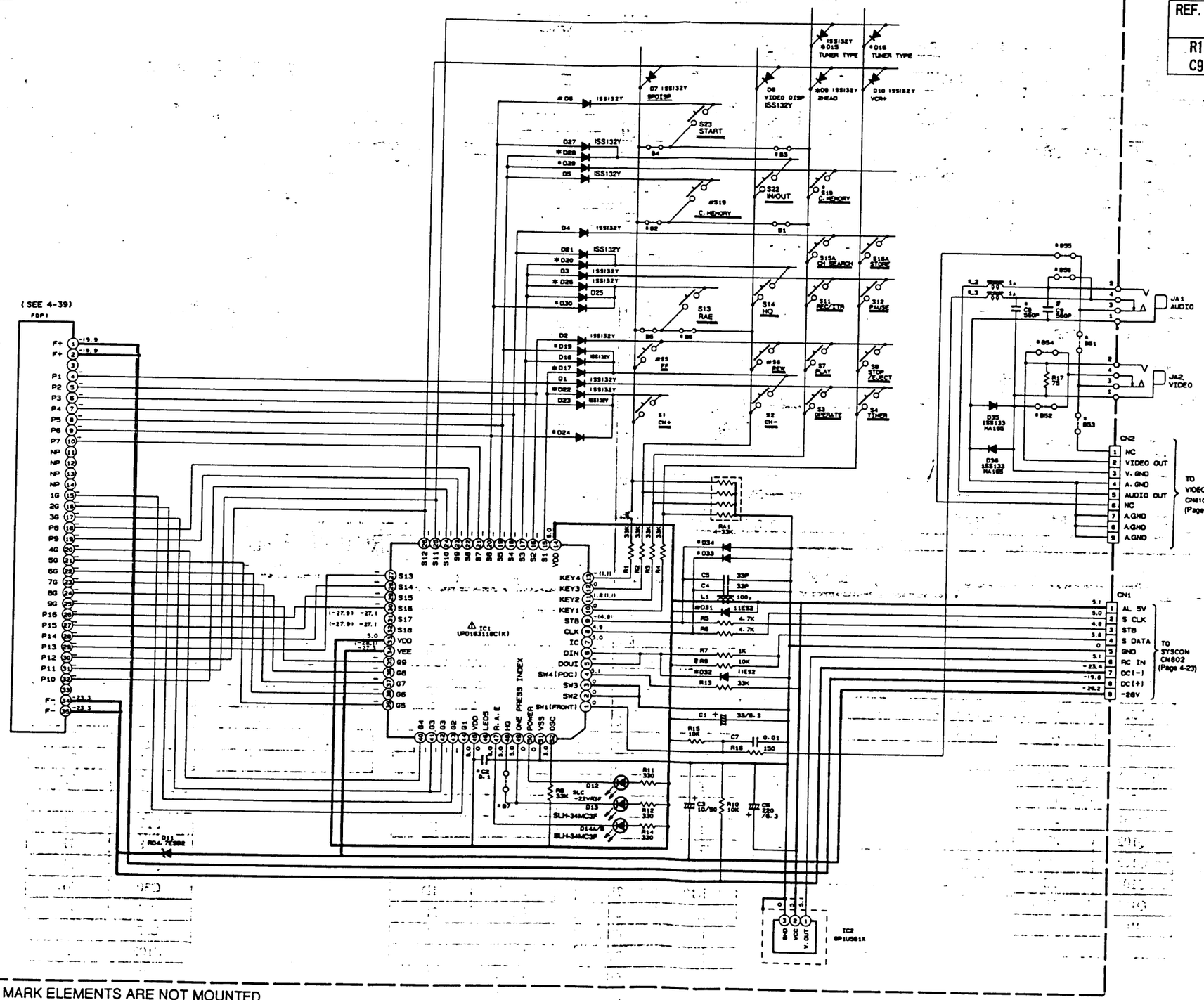
REF. No.	LOCATION
CAPACITOR	
C21	11D
C22	12D
C23	7D
C24	7D
C25	7D
C26	7D
C27	7B
C28	7B
C29	8B
C30	7B
C31	8D
C32	8B
C102	1C
C108	3B
C113	2D

4.17 FRONT SCHEMATIC DIAGRAM

28 FRONT

COMPARISON CHART OF MODELS & MARKS(#)

REF. NO.	MODELS	
	HR-J415E	HR-J415EG
R13	USED	OPEN
C9	OPEN	USED



NOTE : "*" MARK ELEMENTS ARE NOT MOUNTED.

4.18 FRONT CIRCUIT BOARD

MAIN COMPONENT PARTS LOCATION GUIDE

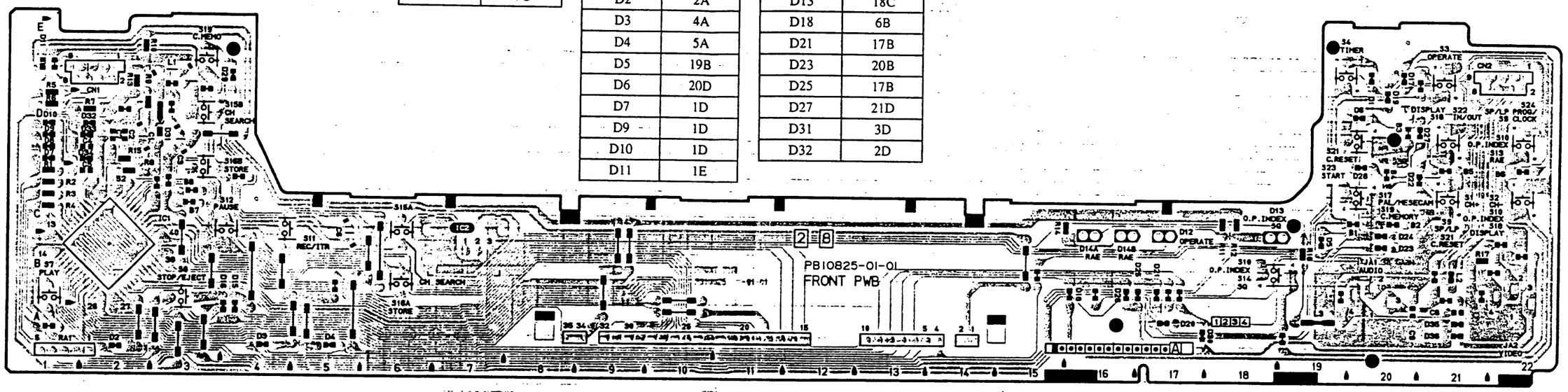
<FRONT PWB>

REF. No.	LOCATION
IC	
IC1	2B
IC2	7C

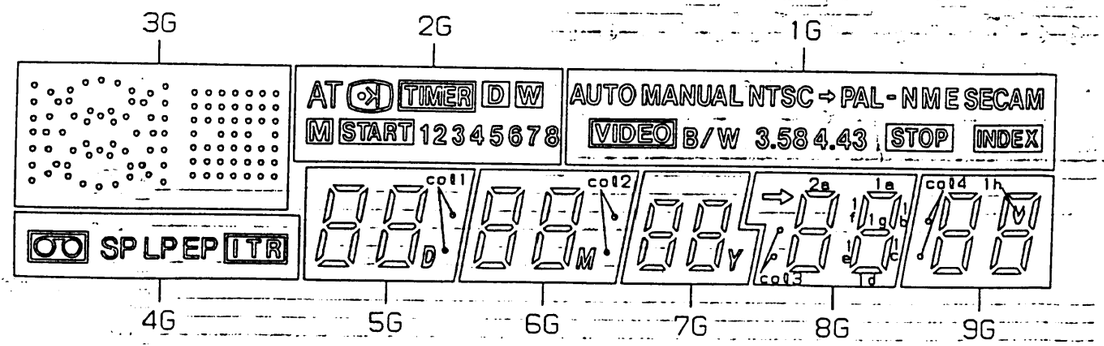
REF. No.	LOCATION
DIODE	
D1	20E
D2	2A
D3	4A
D4	5A
D5	19B
D6	20D
D7	1D
D9	1D
D10	1D
D11	1E

REF. No.	LOCATION
DIODE	
D12	17C
D13	18C
D18	6B
D21	17B
D23	20B
D25	17B
D27	21D
D31	3D
D32	2D

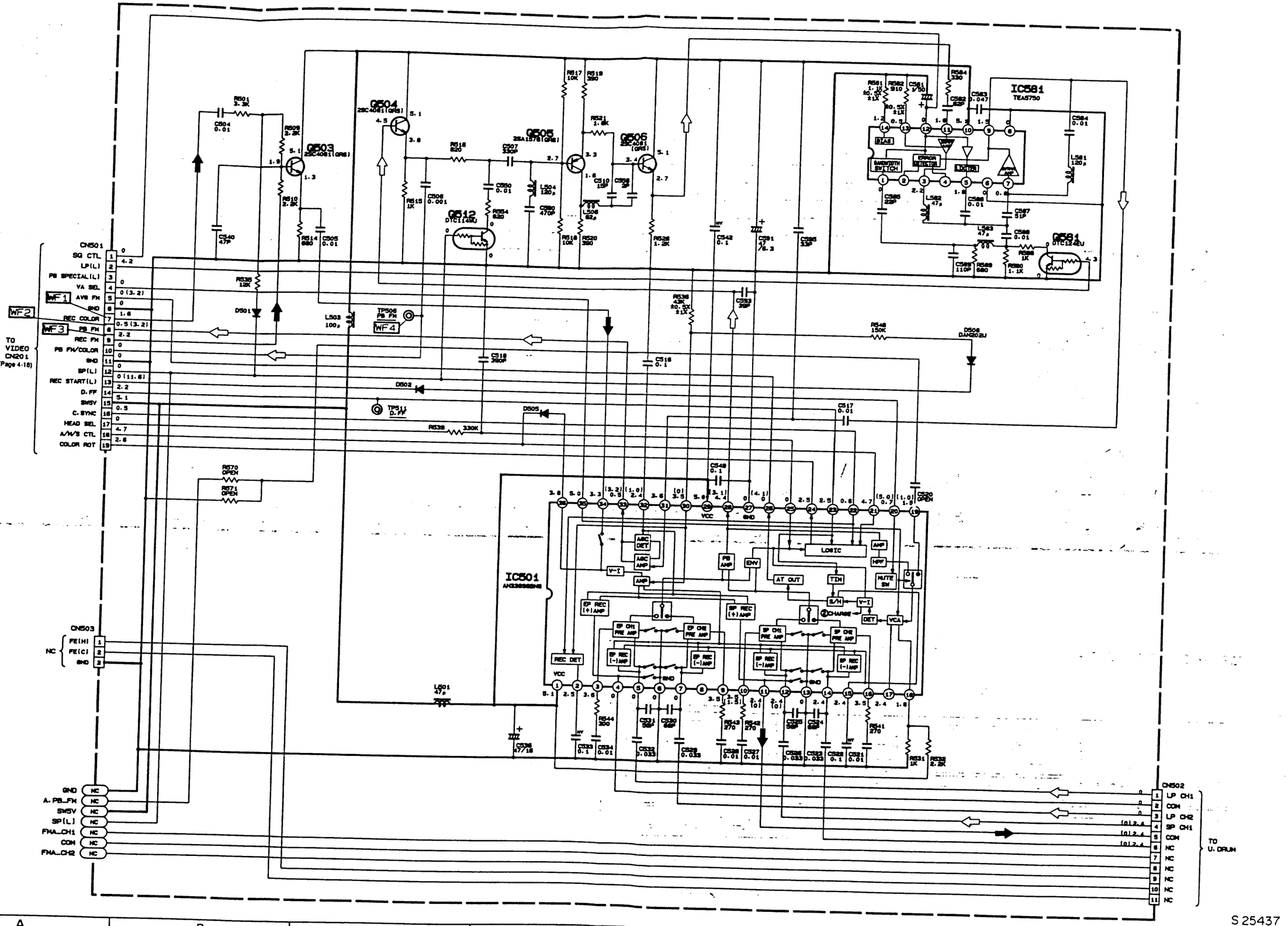
REF. No.	LOCATION
CONNECTOR	
CN1	2E



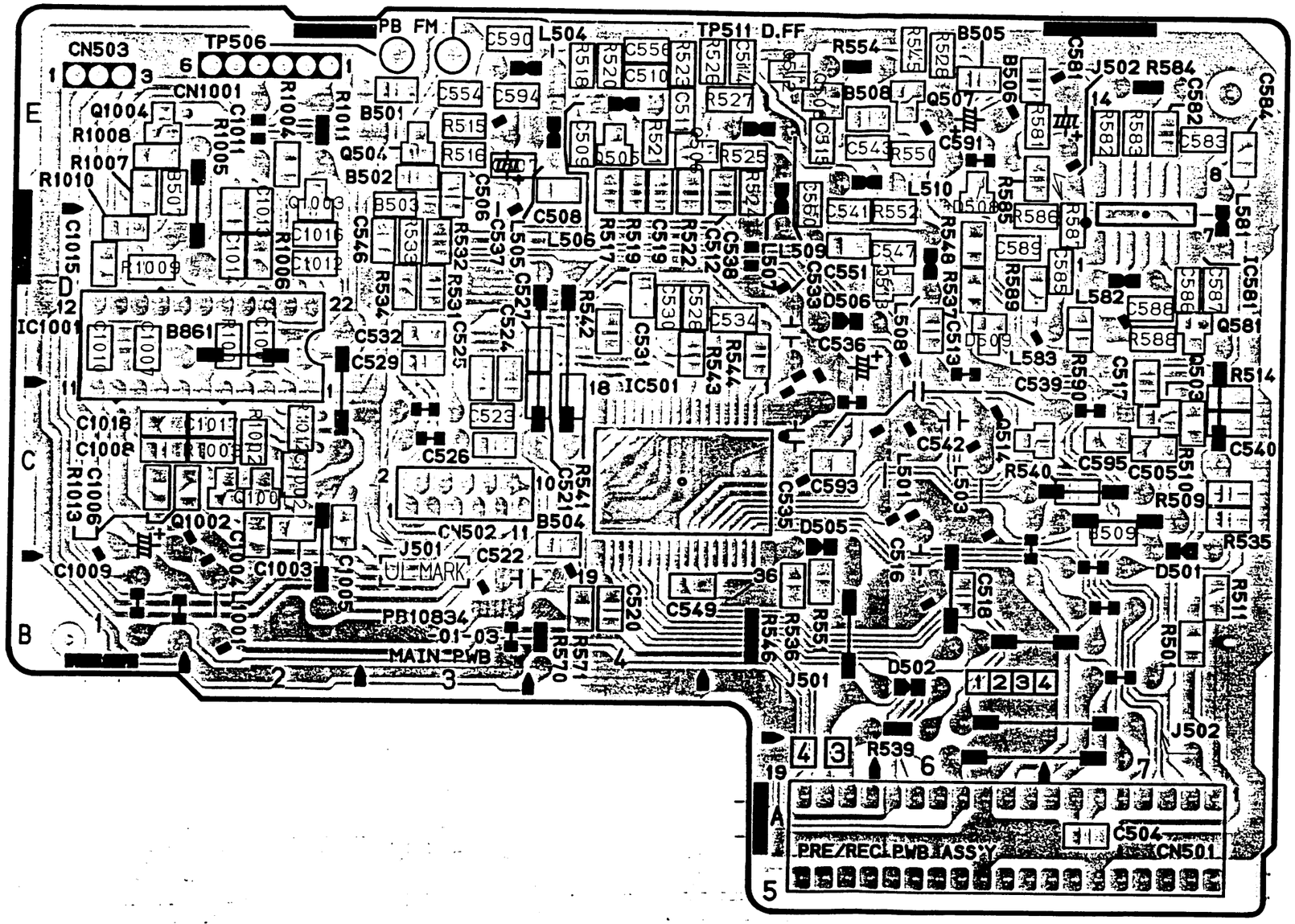
- FDP GRID ASSIGNMENT -



4.19 PRE/REC SCHEMATIC DIAGRAM



4.20 PRE/REC CIRCUIT BOARD


CN503
TP506
PB FM
TP511 D.FF
CN1001
Q1004
R1008
R1007
R1010
C1015
IC1001
B861
C1018
C1008
R1013
C1009
Q1002
C1003
C1005
PB10834-01-03
MAIN PWB
J501
UL MARK
CN502
C522
B504
C549
C520
R571
R570
R546
R536
J501
D502
R539
J502
C504
CN501
PRE/REC PWB ASS'Y
IC501
R554
B505
B506
B508
Q507
C591
L510
L582
IC581
Q581
R514
C540
C595
C505
R509
R535
D501
R511
R501
C581
J502 R584
C582
C583
C584
L581
C543
R550
C541
R552
R585
R586
R587
C589
R589
C585
C586
C587
C588
R588
R503
C517
L583
C539
R590
C542
L503
R540
C593
C535
D505
C516
C518
B509
C536
D506
C551
C547
L509
L507
C538
C533
C513
R548
R537
C534
R544
R543
C528
C530
C531
R542
C532
C529
C526
C523
C521
R541
C524
C527
L505
L506
C508
R517
R519
R522
R512
C546
R534
R531
R532
R525
C506
R527
R524
R523
R521
C509
C510
R520
R518
C511
R515
R516
C554
C594
B501
B502
B503
Q504
R1004
R1011
C1011
R1005
C1012
R1006
C1013
C1014
C1001
C1002
C1004
C1006
C1007
C1010
C1016
C1017
C1100
R1001
R1002
R1003
R1009
R1012
B507
B510
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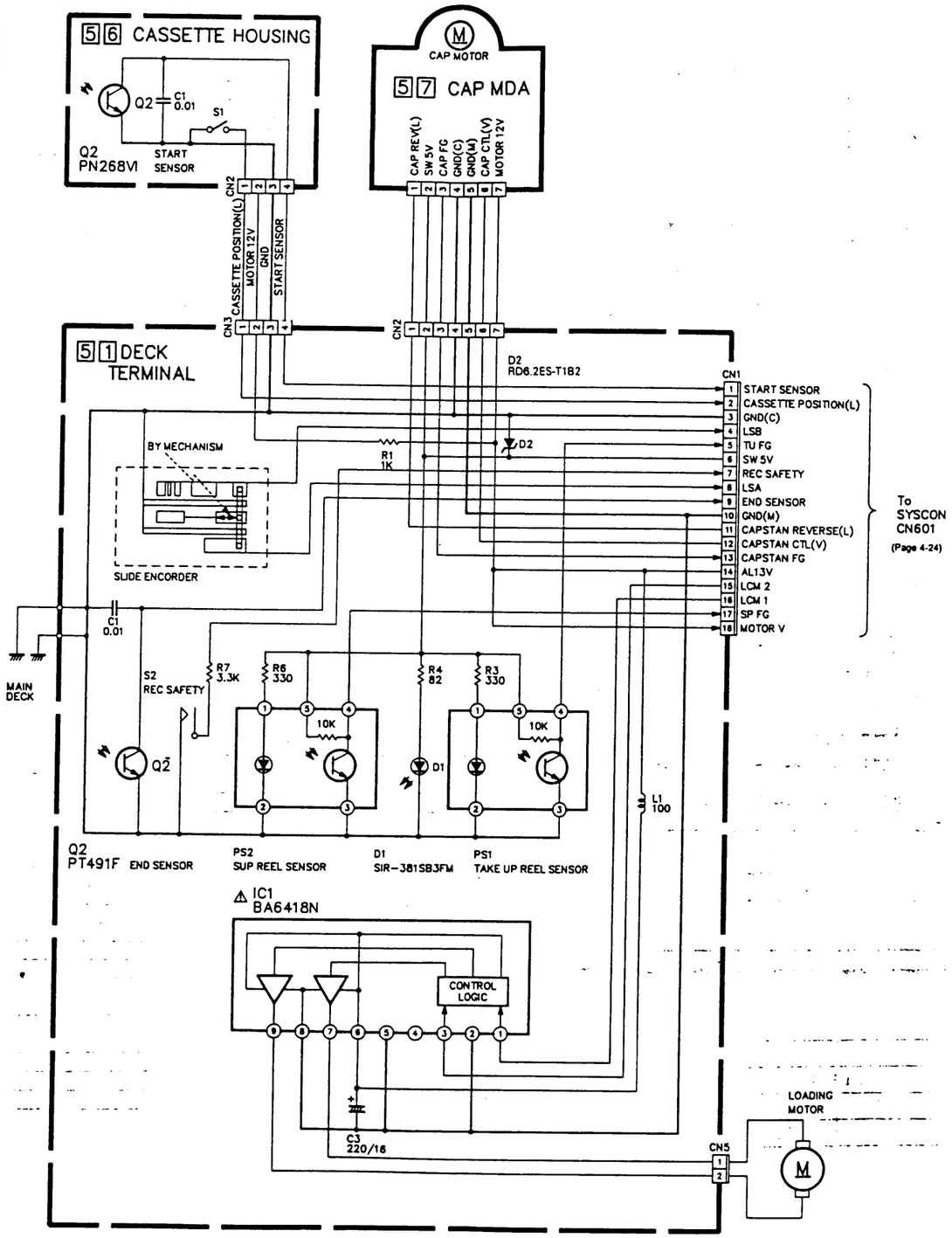
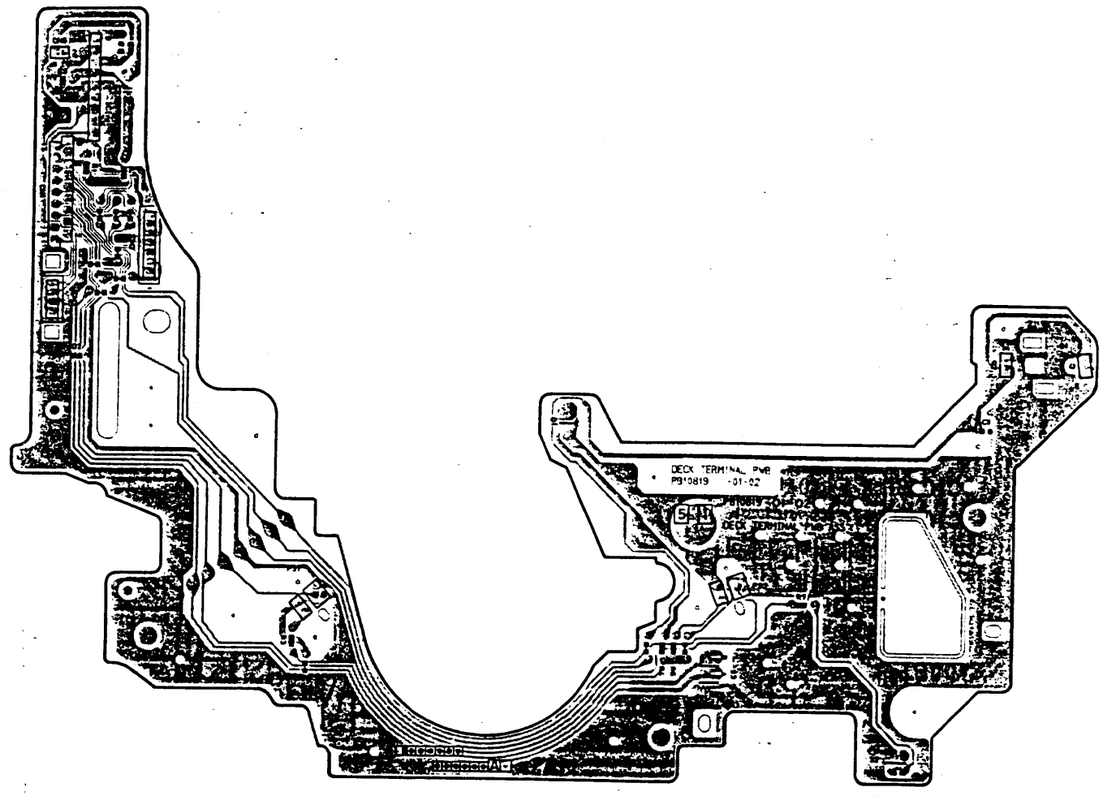
4.21 DECK TERMINAL, CASSETTE HOUSING AND CAPSTAN MDA SCHEMATIC DIAGRAMS

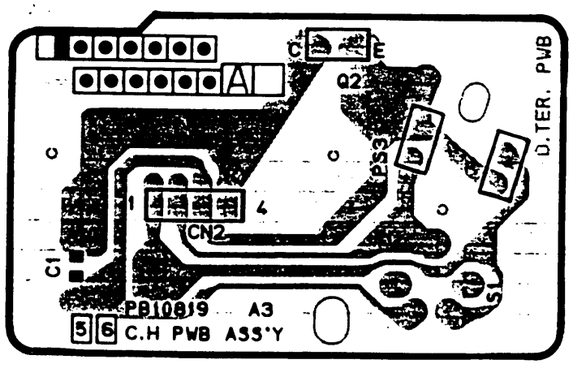


4.22 DECK TERMINAL, CASSETTE HOUSING AND A/C HEAD CIRCUIT BOARDS

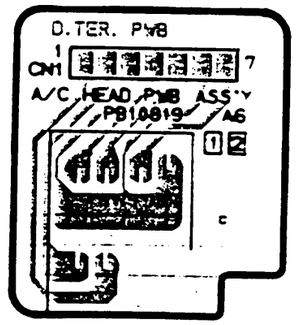
— DECK TERMINAL —



— CASSETTE HOUSING —

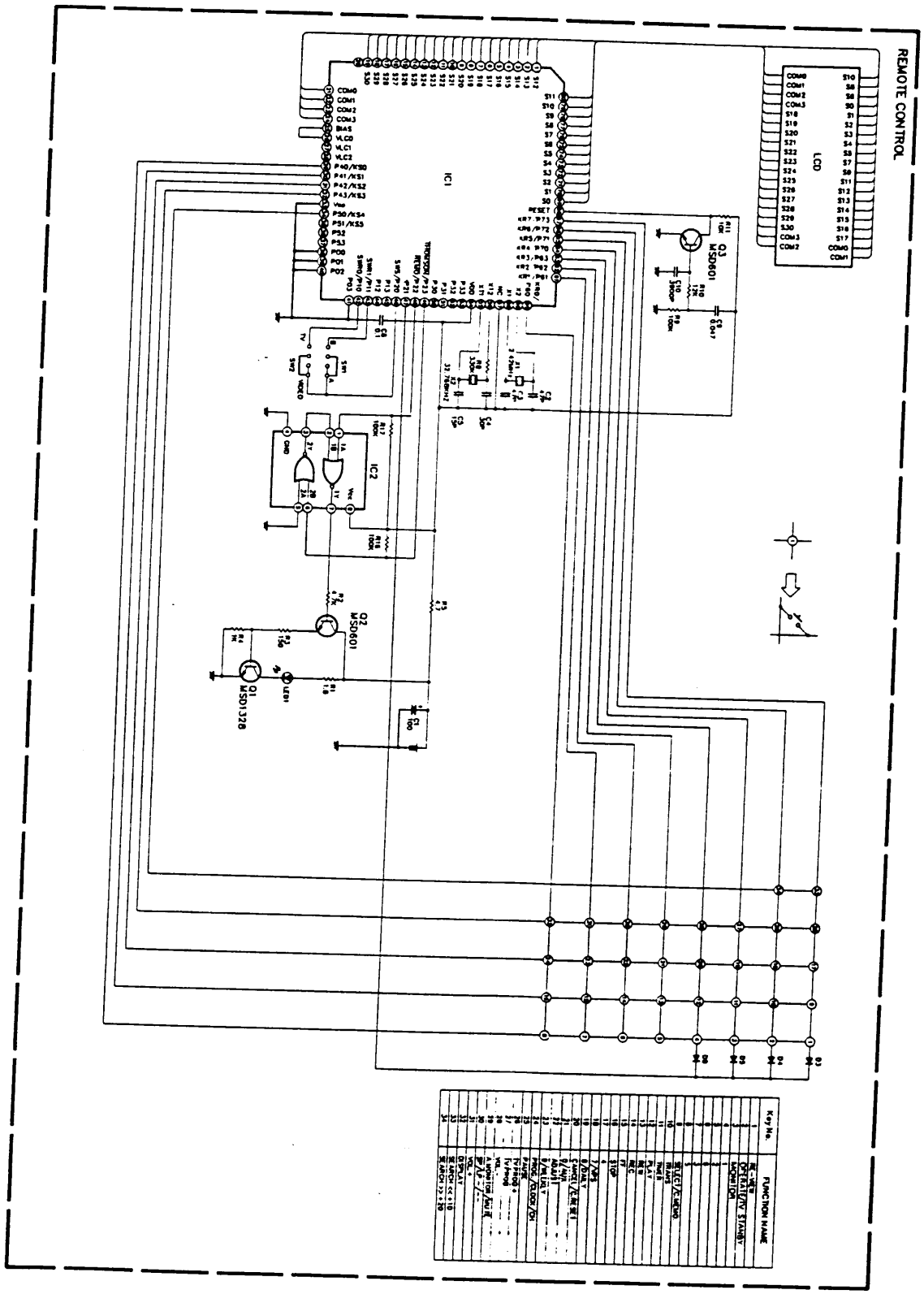


— A/C HEAD —



4.23 REMOTE CONTROL SCHEMATIC DIAGRAM

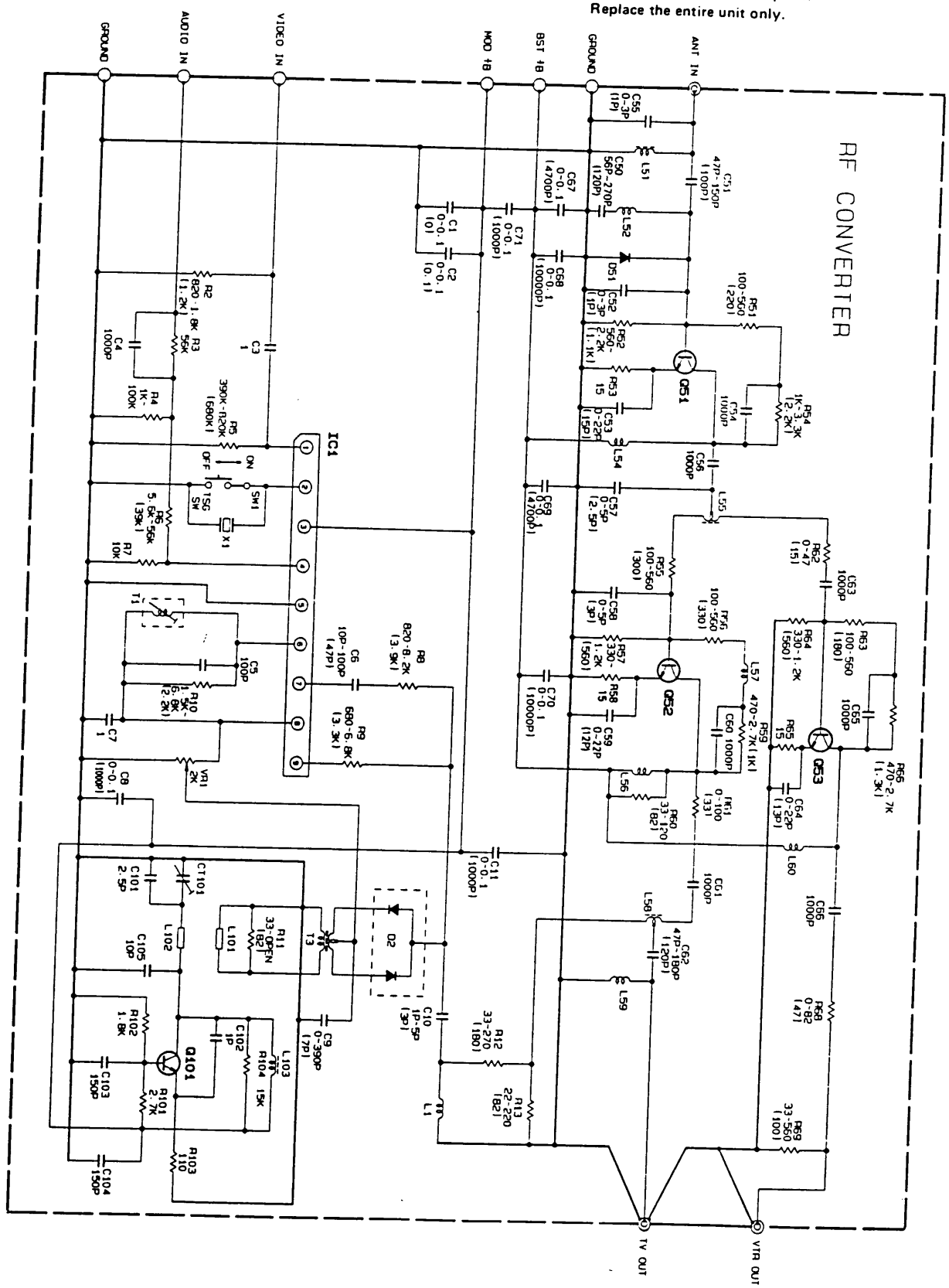
NOTE:
1. All parts shown in this schematic are critical for safety.
2. This schematic is only for reference.
   Avoid replacing individual parts.
   Replace the entire unit only.



4.24 RF CONVERTER SCHEMATIC DIAGRAM

NOTE:

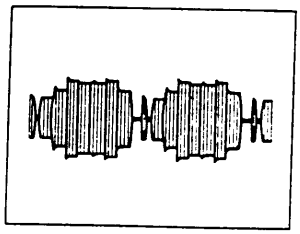
1. All parts shown in this schematic are critical for safety.
2. This schematic is only for reference.
   Avoid replacing individual parts.
   Replace the entire unit only.



4.25 WAVEFORMS

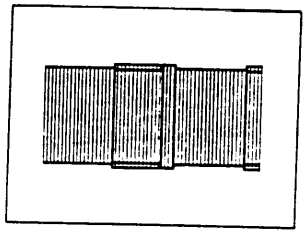
— VIDEO —

WF1 REC COLOR



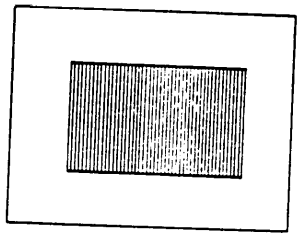
REC 0.23 Vp-p
5 mV/20μsec/DIV

WF2 PB FM



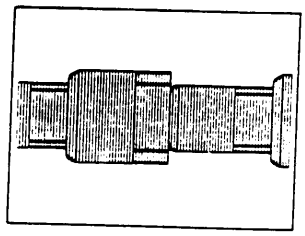
PB 0.42 Vp-p
10 mV/5 msec/DIV

WF3 REC FM



REC 0.65 Vp-p
20 mV/5 msec/DIV

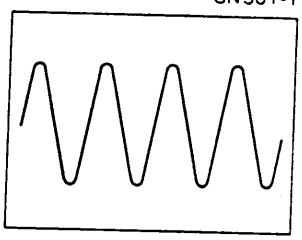
WF4 PB FM/COLOR



PB 0.4 Vp-p
10 mV/5 msec/DIV

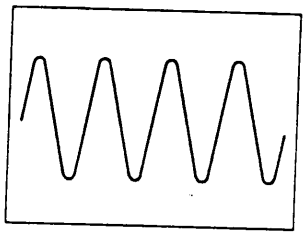
— AUDIO —

WF1 CN301-1



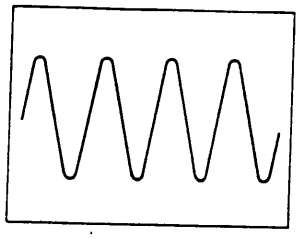
REC 44.0 Vp-p
1.0 V/10μsec/DIV

WF2 TP333 ERASE



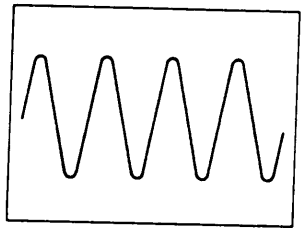
REC 36.0 Vp-p
1.0 V/10μsec/DIV

WF3 IC301-12



PB 2.2 Vp-p
0.1 V/2 msec/DIV

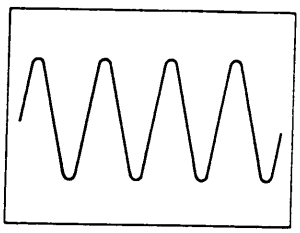
WF4 AUX IN



REC 0.2 Vp-p
10 mV/1 msec/DIV

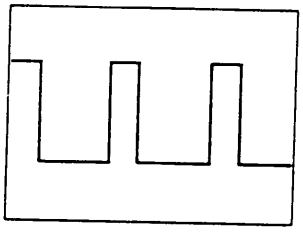
— SERVO —

WF5 AUDIO OUT



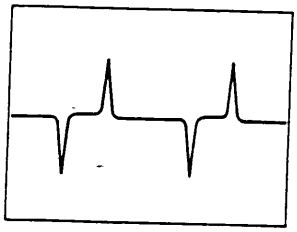
REC/PB 2.4 Vp-p
0.1 V/1 msec/DIV

WF1 IC401-29



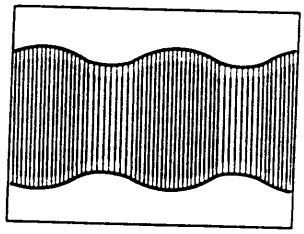
REC 6.0 Vp-p
0.1 V/10 msec/DIV

WF2 TP401 CTL PULSE



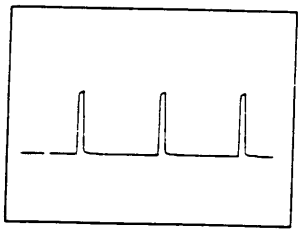
PB 2.5 Vp-p
50 mV/10 msec/DIV

WF3 CAP. FG



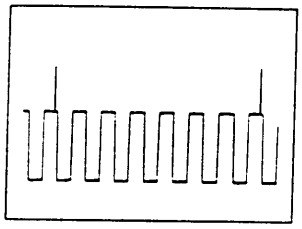
REC 3.0 Vp-p
0.1 V/10 msec/DIV

WF4 C. SYNC



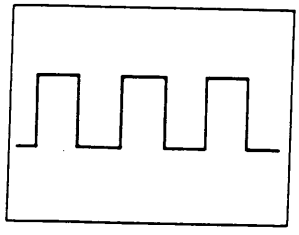
REC 4.2 Vp-p
0.1 V/20 μsec/DIV

WF5 D. PG/FG



REC/PB 4.2 Vp-p
0.1 V/5 msec/DIV

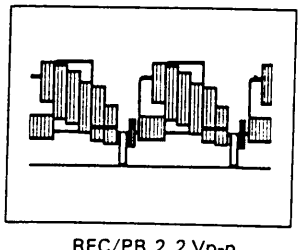
WF6 TP411 D. FF



REC/PB 5.0 Vp-p
0.2 V/10 msec/DIV

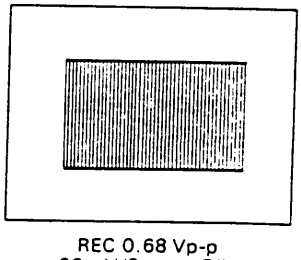
— VIDEO UNIT —

WF1 VIDEO OUT



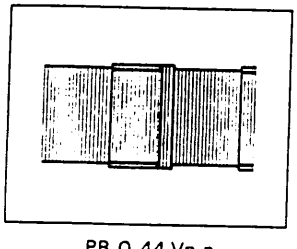
REC/PB 2.2 Vp-p
50 mV/20 μsec/DIV

WF2 REC FM



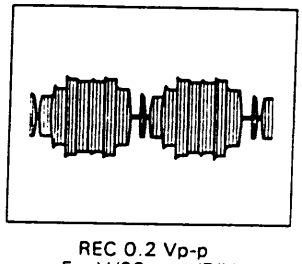
REC 0.68 Vp-p
20 mV/2 msec/DIV

WF3 PB FM



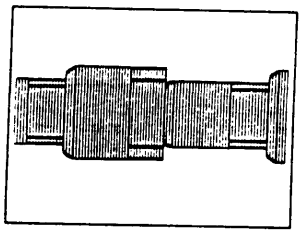
PB 0.44 Vp-p
10 mV/5 msec/DIV

WF4 REC COLOR



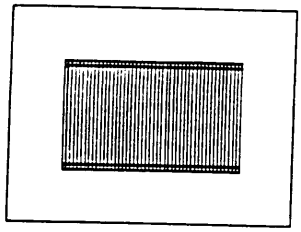
REC 0.2 Vp-p
5 mV/20 μsec/DIV

WF5 PB COLOR



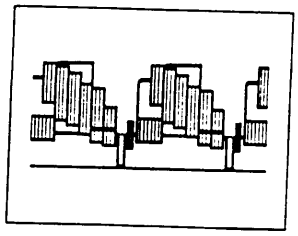
PB 0.36 Vp-p
10 mV/5 msec/DIV

WF6 REC FM



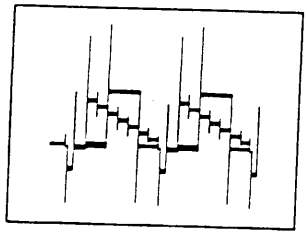
REC 1.3 Vp-p
50 mV/2 msec/DIV

WF7 IC2-14



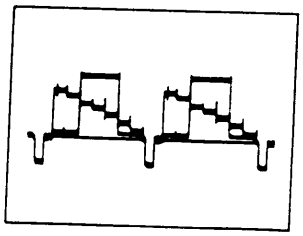
REC 1.1 Vp-p
20 mV/20 µsec/DIV

WF8 IC2-12



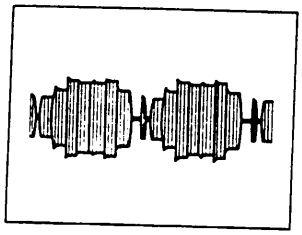
PB 0.32 Vp-p
10 mV/20 µsec/DIV

WF9 IC2-11



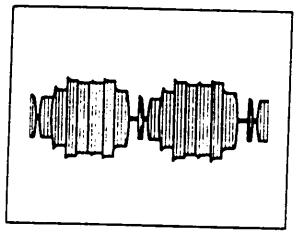
REC 0.52 Vp-p
20 mV/20 µsec/DIV

WF10 REC COLOR



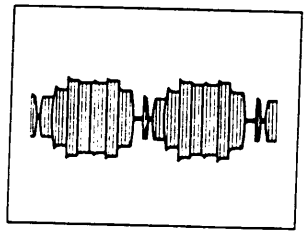
REC 0.4 Vp-p
10 mV/20 µsec/DIV

WF11 IC2-37



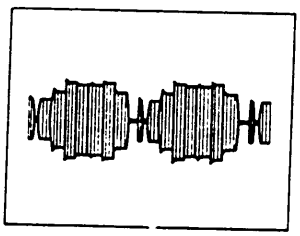
PB 0.8 Vp-p
20 mV/20 µsec/DIV

WF12 IC2-39



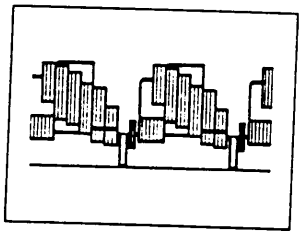
PB 0.8 Vp-p
20 mV/20 µsec/DIV

WF13 PB COLOR



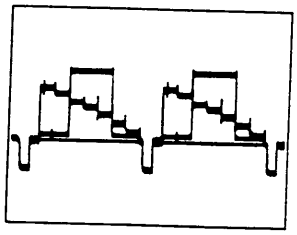
PB 0.08 Vp-p
5 mV/20 µsec/DIV

WF14 AUX IN



REC 1.1 Vp-p
20 mV/20 µsec/DIV

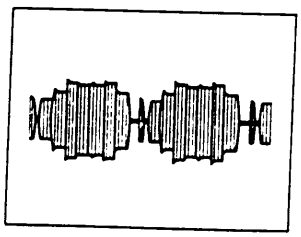
WF15 IC1-4



REC 0.3 Vp-p/PB 0.38 Vp-p
10 mV/20 µsec/DIV

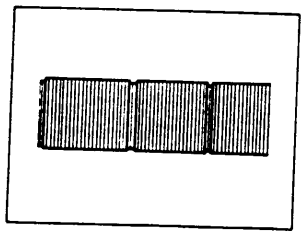
— PRE/REC —

WF1 REC COLOR



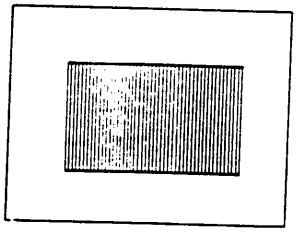
REC 0.23 Vp-p
5 mV/20 µsec/DIV

WF2 PB FM



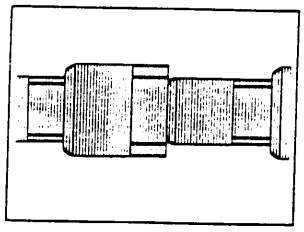
PB 0.35 Vp-p
20 mV/5 msec/DIV

WF3 REC FM



REC 0.65 Vp-p
20 mV/10 µsec/DIV

WF4 TP506 PB FM



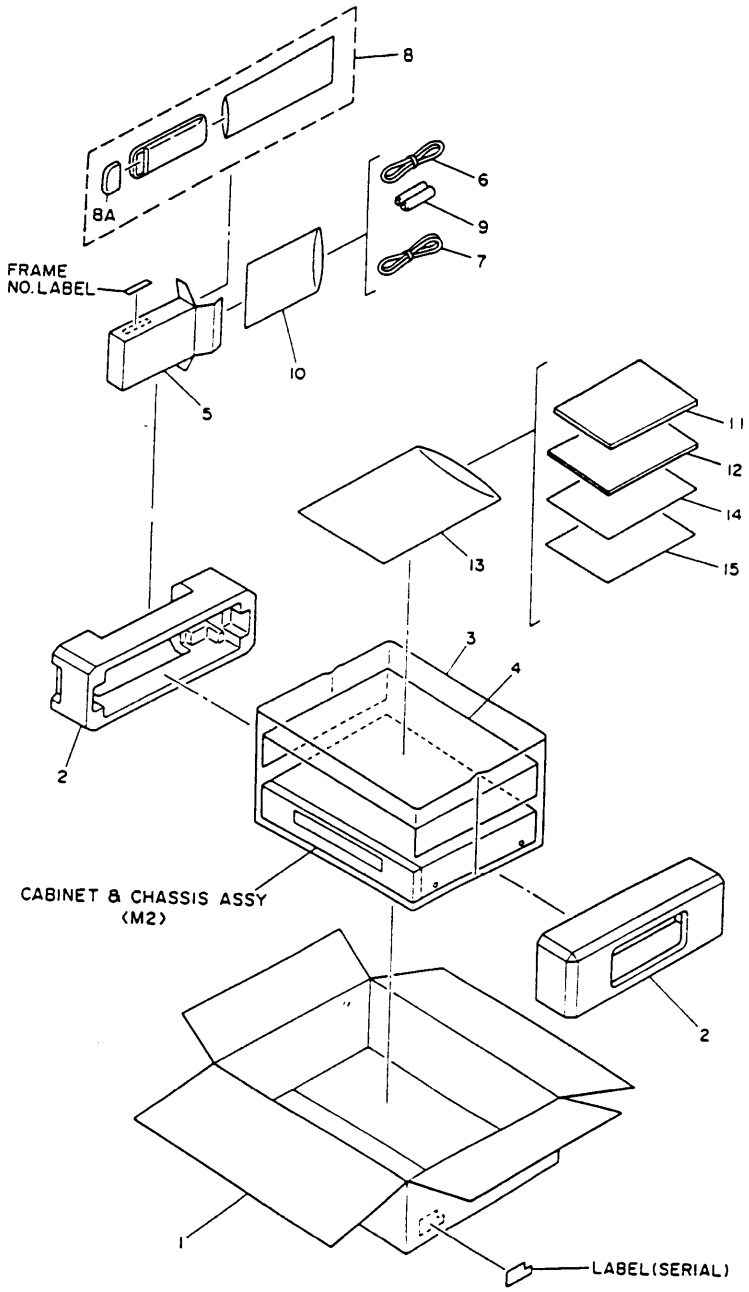
PB 0.4 Vp-p
10 mV/5 msec/DIV

SECTION 5
PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

5.1 PACKING AND ACCESSORY ASSEMBLY <M1>

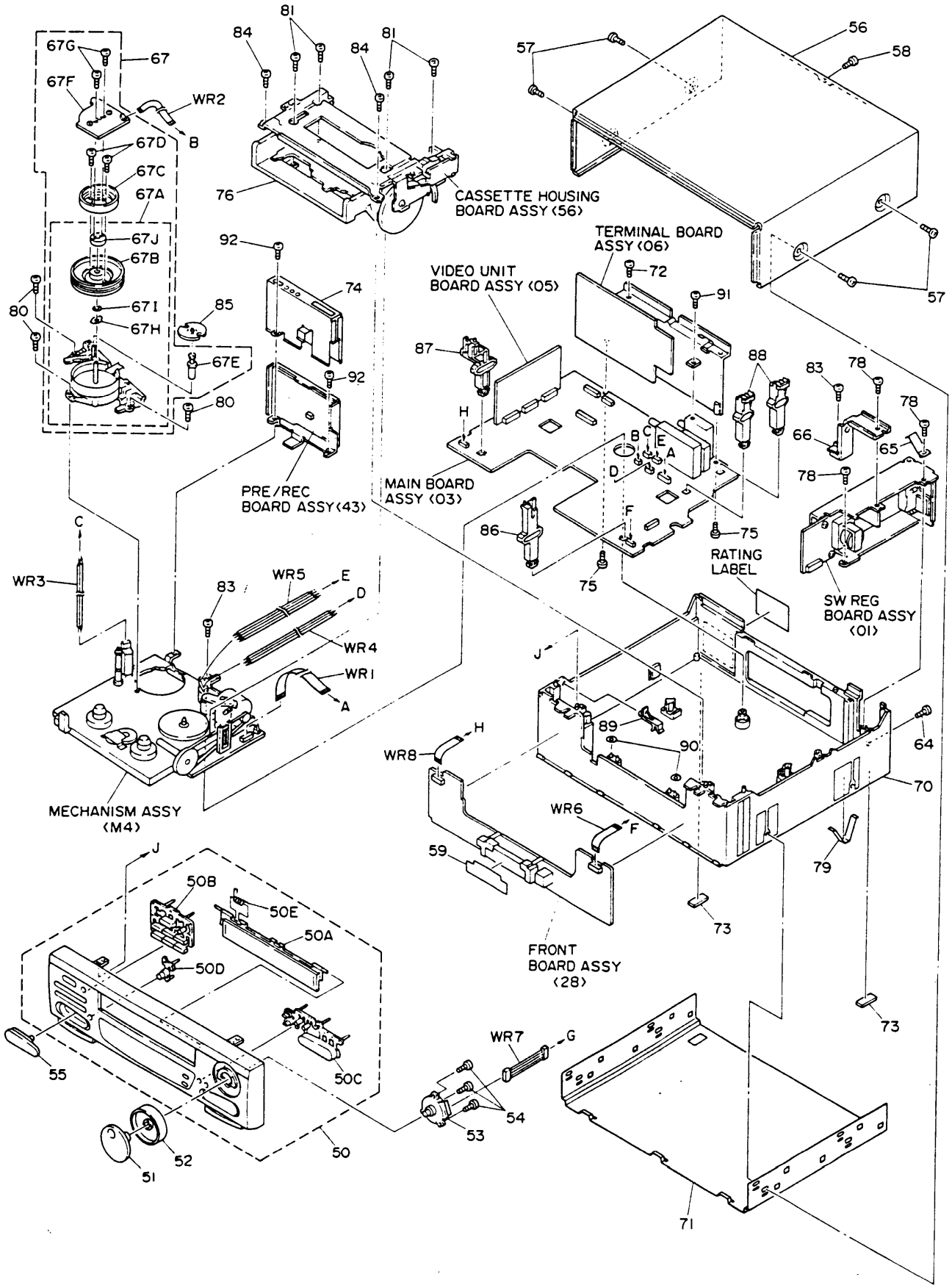


#⚠	REF No.	PART No.	PART NAME, DESCRIPTION
			PACKING AND ACCESSORY ASSEMBLY <M1>
	1	PQ35075-17-5	PACKING CASE,J415E
		PQ35075-19-5	PACKING CASE,J415EG
	2	PQ35112A	CUSHION ASSY
	3	PQM30021-88	POLY BAG
	4	PQ41026-37	PROTECT SHEET
	5	PQ34715-3	CASE(ACCESSORY)
⚠	6	QMP40E0-183	POWER CORD
⚠	7	PEAC0300-02	RF CABLE,J415EG
⚠		PU59168-7	RF CABLE,J415E
⚠	8	PQ11534S-17	REMOTE CONTROLLER,J415E
⚠		PQ11534U-17	REMOTE CONTROLLER,J415EG
	8A	PQ46063-2	CAP(BATTERY)
	9	R6PRPA-2ST	BATTERY,X2
	10	QPGA020-02005	POLY BAG
⚠	11	PU30425-1493	INSTRUCTIONS
⚠	12	PU30425-1494	INSTRUCTIONS,J415E
	13	QPGA025-03505	POLY BAG
⚠	14	PQ45146-47	SHEET(SPAIN),J415E
	15	PQ34978-13	SHEET(S.V.)

5.2 CABINET AND CHASSIS ASSEMBLY <M2>

BEWARE OF BOGUS PARTS

Parts that do not meet specifications may cause trouble in regard to safety and performance. We recommend that genuine JVC parts be used.



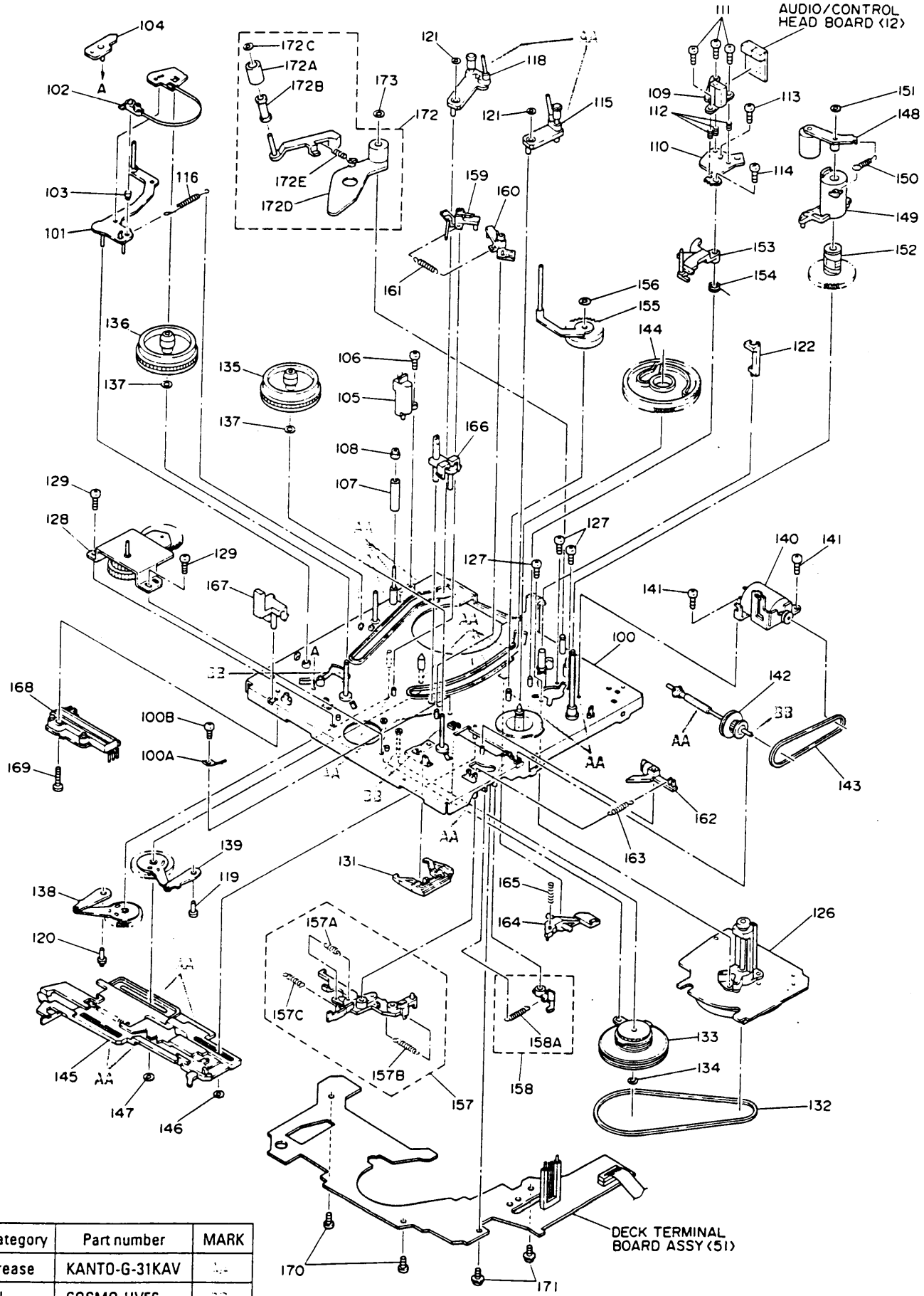
#△	REF No.	PART No.	PART NAME, DESCRIPTION

****

CABINET AND CHASSIS ASSEMBLY <M2>

	50	PQ11616Q-9	FRONT PANEL ASSY
	50A	PQ21627-6	CASSETTE DOOR
	50B	PQ21637-5	BUTTON(1)
	50C	PQ21638-5	BUTTON(2)
	50D	PQ34915	BUTTON(3)
	50E	PQ46414	TORSION SPRING
	51	PQ35133B	KNOB(JOG)ASSY
	52	PQ34917-2	KNOB(SHUTTLE)
	53	PEME0757-03	JOG SHUTTLE ASSY
	54	SDSF2608Z	SCREW,X3 JOG SHUTTLE ASSY
	55	PQ35007	COVER(JACK)
△	56	PQ11623	TOP COVER
	57	PQ43827	SPECIAL SCREW,X4 TOP COVER
	58	SDSF3008M	SCREW,TOP COVER
	59	PQ46283	FILTER(FDP)
	64	SDSB3008M	SCREW,INLET
	65	PQ46139	EARTH PLATE,SW REG BOARD
	66	PQ35010	BRACKET(M.DECK)
	67	PDV2335A	DRUM ASSY
	67A	PDM2232Z	DRUM SUB ASSEMBLY
	67B	PDM3353J	UPPER DRUM ASSEMBLY
	67C	PDZ0141-2	ROTOR ASSEMBLY
	67D	SPSH2660Z	SCREW,X2
	67E	PDM4311A-1	ROLLER ASSEMBLY
△	67F	PDZ0141	STATOR ASSEMBLY
	67G	SPSP2606Z	SCREW,X2
	67H	PDM4343A	BRUSH ASSEMBLY
	67I	PDM4050-9	WASHER
	67J	PDM4345A	COLLAR ASSEMBLY
△	70	PQ11622-1-10	BOTTOM CHASSIS
△	71	PQ11625	BOTTOM COVER
	72	SDSF3010Z	SCREW,TERMINAL BOARD
	73	PQ43013-5	FOOT,X2
	74	PQ21513-1-1	SHIELD CASE,PRE
	75	SDSF3008Z	SCREW,X2 TERMINAL BOARD ASSY
	76	PUS29672C-1	CASSETTE HOUSING ASSY
	78	SDSF3010Z	SCREW,X3 P.SUPPLY BOARD ASSY
	79	PQ34737	EARTH PLATE,POWER SUPPLY
	80	SPST2610Z	SCREW,X3 DRUM
	81	SDST2608Z	SCREW,X4 CASSETTE HOUSING
	83	PQ43831	SPECIAL SCREW,X2 MECHA
	84	SDSF3010Z	SCREW,X2 CASSETTE HOUSING
	85	PQ45160	INERTIA PLATE
	86	PEME0938	HOLDER (PWB),CASSETTE HOUSING
	87	PEME0942	HOLDER (MAIN),CASSETTE HOUSING
	88	PEME0943-01-01	HOLDER (REG.),X2
	89	PQ34691	PWB HOLDER
	90	Q03093-833	WASHER,X2
	91	SDST2605Z	SCREW,RF CONVERTER
	92	SDSG2606Z	SCREW,X2 PRE
	WR1	PW30802-1826	FFC WIRE,D/T
	WR2	PW30803-0422	FFC WIRE,DRUM
	WR3	PW30701-30AAYY	WIRE,FE
	WR4	PW30702-12AAYY	WIRE,CTL
	WR5	PW30705-12AAYY	WIRE,AUDIO
	WR6	PW30802-0913	FFC WIRE,FRONT
	WR7	PW30218-0771613	WIRE,JOG
	WR8	PW30802-0913	FFC WIRE,FRONT

5.3 MECHANISM ASSEMBLY <M4>



Category	Part number	MARK
Grease	KANTO-G-31KAV	AA
Oil	COSMO-HV56	BB

NOTE: The section marked in AA and BB indicate lubrication and greasing areas.

MECHANISM ASSEMBLY <M4>

#△ REF No.	PART No.	PART NAME, DESCRIPTION
100	PQ20650K-33	MAIN DECK ASSEMBLY
100A	PQ43849	EARTH PLATE
100B	SPST2604Z	SCREW
101	PQ43497K	TENSION ARM ASSY
102	PQ45023A-1	TENSION BAND ASSY
103	PQ43503-1-4	ADJUST PIN
104	PQ44246	TENSION BAND BRACKET-3
105	PEHE0237	FULL ERASE HEAD
106	SDSF2614Z	SCREW,FULL ERASE HEAD
107	PQ43505-1-1	ROLLER
108	PQ43506	GUIDE POLE CAP
109	PEHE0182	AUDIO CONTROL HEAD
110	PQ43509	HEAD BASE
111	PQ43687A	SPECIAL SCREW,X3
112	PQM30002-192	COMPRESSION SPRING,X3
113	SPSF2608M	SCREW
114	SPSP2606Z	SCREW
115	PU61103-2-7	POLE BASE ASSY(TAKE-UP)
116	PQ43500	TENSION SPRING
118	PU61151-2-6	POLE BASE ASSY(SUPPLY)
119	PQ45895	STOPPER(T)
120	PQ45894	STOPPER(S)
121	PQM30017-41	SLIT WASHER,X2
122	PQ43675-1-5	TAPE GUARD
△ 126	PU61285	CAPSTAN MOTOR
127	SPSG2608Z	SCREW,X3
128	PU60618-1-3	IDLER GEAR UNIT
129	SPST2606Z	SCREW,X2
131	PQ43532B-4	CHANGE LEVER ASSEMBLY
132	PQM30003-24	TIMER BELT
133	PU60953-1-6	CLUTCH UNIT
134	PQM30017-8	SLIT WASHER
135	PQ46072A	REEL DISK ASSY,(TAKE-UP)
136	PU60859-1-4	REEL DISK (SUPPLY)
137	PQM30018-54	SPACER,X2
138	PQ43537B	LOADING ARM ASSY (SUPLLY)
139	PQ43542D-4	LOADING ARM AY (TAKE-UP)
140	PQ43676B-5	LOADING MOTOR ASSY
141	SPST2606Z	SCREW,X2
142	PQ43548A-2	WORM CLUTCH ASSY
143	PQM30003-23	BELT
144	PQ32413-1-6	CONTROL CAM
145	PQ43555C-10	PLATE ASSY
146	PQM30017-12	SLIT WASHER
147	PQM30017-8	SLIT WASHER
148	PQ43523C	PINCH ROLLER LEVER ASSY
149	PQ32415	PINCH ROLLER PRESS LEVER
150	PQM30001-233	TENSION SPRING
151	PQM30017-13	SLIT WASHER
152	PQ32416-2	PINCH ROLLER CAM
153	PQ43567A-13	GUIDE ARM ASSY
154	PQ43569-1-3	TORSION SPRING
155	PQ45073B	HALF LOADING GEAR ASSY

#△ REF No.	PART No.	PART NAME, DESCRIPTION
156	PQM30017-13	SLIT WASHER
157	PQ43575A-5	CANCELL LEVER ASSY
157A	PQM30001-273	TENSION SPRING
157B	PQM30001-237	TENSION SPRING
157C	PQM30001-274	TENSION SPRING
158	PQ43578A-2	HOOK ASSY
158A	PQM30001-238	TENSION SPRING
159	PQ43581E	MAIN BRAKE ASSY(SUPPLY)
160	PQ43582D	MAIN BRAKE ASSY(TAKE-UP)
161	PQM30001-251	TENSION SPRING
162	PQ43583A-3	SUB BRAKE ASSY (TAKE-UP)
163	PQM30001-235	TENSION SPRING
164	PQ43584A-5	CAPSTAN BRAKE ASSY
165	PQM30002-201	COMPRESSION SPRING
166	PQ21546	LED PRISM
167	PU61281	REC SAFETY SWITCH
168	PU60622-1-2	SLIDE SWITCH
169	SDSF2614Z	SCREW
170	SDST2616Z	SCREW,X2
171	GPSF2608Z	SCREW,X2
172	PQ46016B-3	CLEANER ASSY
172A	PQ46019	CLEANER
172B	PQ46018	CLEANER ROLLER
172C	PQM30017-38	SLIT WASHER
172D	PQ34677-1-3	CLEANER LEVER
172E	PQ46155-1-2	TORSION SPRING
173	PQM30017-32	SLIT WASHER